THE MONTHLY

Review

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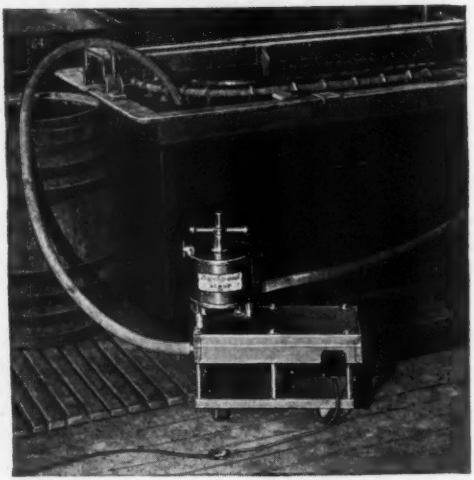
Dirty Plating Solutions will Plate Metal – but at a Cost?



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WHICH WAY TO TURN

By E. T. CANDEE

WITH the exception of electrotyping and zinc and cadmium plating, practically all electrodeposition up to 1930 was for decorative purposes. In the 30's electrodeposition was used to a limited extent for such engineering purposes as hard surfacing by chromium plating, building up of parts with heavy nickel plating, and iron plating of printing plates. The progress in this line was slow and in many cases met with considerable resistance due to the lack of understanding of the possibilities of electroplating, until the war period.

In the last three years, the engineering uses of electrodeposition have expanded with the simultaneous elimination of decorative plating until the total amount of plating is at least as great as it was in peacetime, and in addition is now 100% functional.

With the declaration of peace, the old decorative plating will come back again but will always be subject to the whims of fashion and the personal likes and dislikes of the consuming public. It is doubtful that plastics will materially reduce the ultimate use of plating but it is quite possible that the public will like pink, blue, and other colors for a period and will not be interested in metallic finishes. Plating for engineering purposes is not subject to these whims since all such processes have been proven to be economically justified before they have been adopted; their use will be continued as long as there is real justification. Advances in other lines will be made which may affect the ultimate status of particular plating processes but it is doubtful whether these advances will eliminate any of them.

Whereas the picture for plating looked very black two years ago and many were throwing up their hands about the future of the industry, the picture today looks far brighter in that the uses of plating have expanded in a sounder field. It appears that in addition to the decorative plating which we have known, there will be a far greater use of plating for engineering purposes.

Among the new processes which can be mentioned are: silver plating of bearings, indium plating of hardening of alloys, tin plating of tin plate, and porous chromium plating of cylinders. With the advent of these new processes, every member should learn all that is possible about them to be ready for what is to come.

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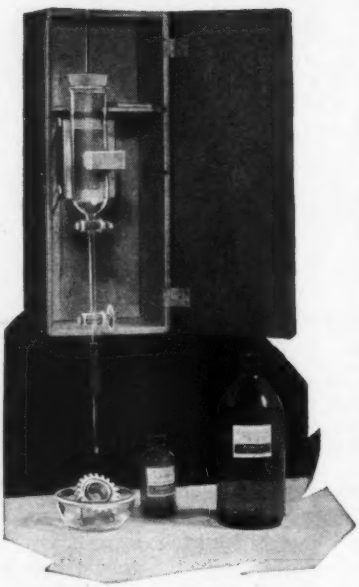

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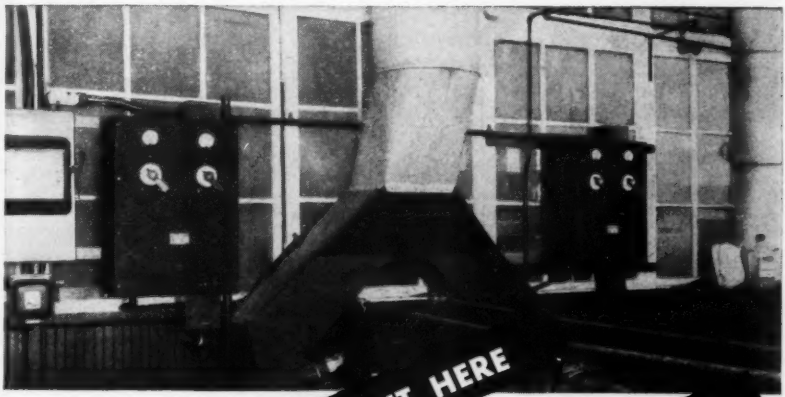

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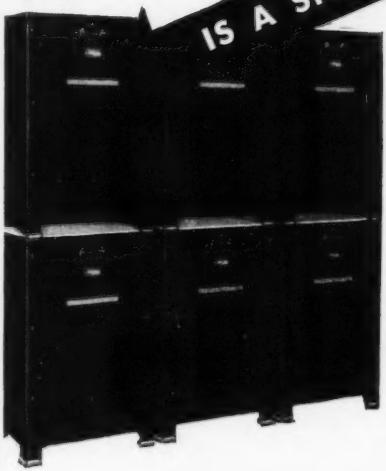

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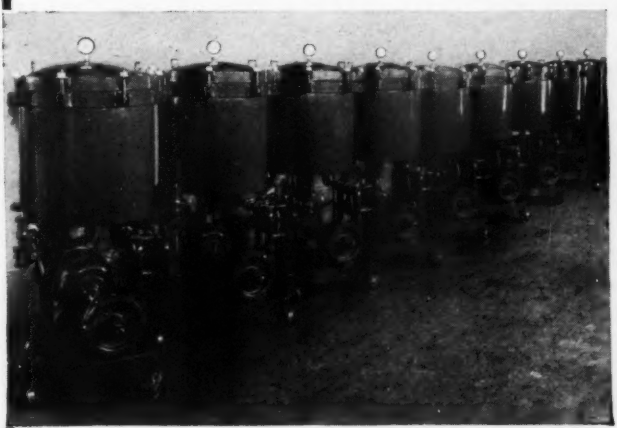

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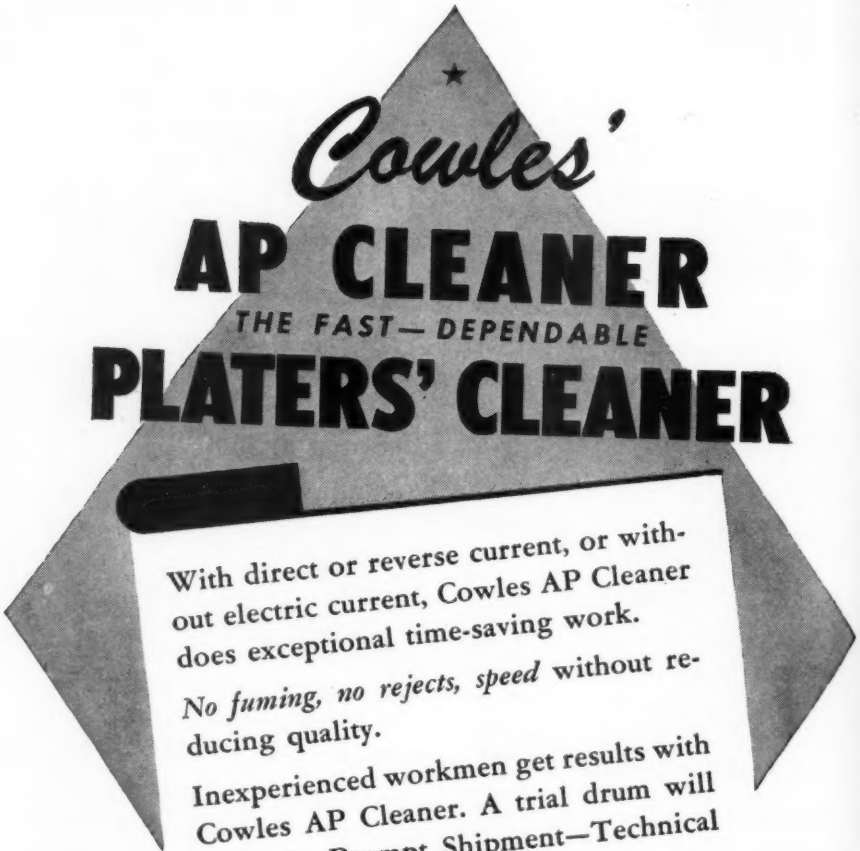
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The Fundamentals of Chemistry for Electroplaters

Part IV. Atoms and Molecules

By SAMUEL GLASSTONE, D.Sc., Ph.D.

WHAT IS A MOLECULE?

WHEN the modern idea of the atom as the unit of chemical structure was first put forward (see Part III, Monthly Review, January 1944) it was regarded as applying both to elements and to compounds. For example, the smallest conceivable particle of the element hydrogen is the atom of hydrogen; similarly, the smallest particle of the compound water, that still retains the chemical properties of this substance, was thought of as an "atom" of water. However, it was suggested by Avogadro, in 1811, that a distinction should be made between elements and compounds, and that the word atom should be restricted to elements. In addition, he introduced the term "molecule," which could be applied to both elements and compounds, and he distinguished between atoms and molecules in the following manner. A molecule is the smallest particle of an element or a compound that can *exist in the free state.* Thus, the smallest particle of the compound water that is capable of existence is the molecule of water; similarly, a molecule of hydrogen is the smallest particle of this element that can exist for any length of time. An atom, on the other hand, is the smallest conceivable particle of *an element;* it is the smallest unit of the element that can take part in chemical combination, or that can be present in a molecule of a compound. When atoms of different elements combine together they form a molecule of a compound. For example, the combination of an atom of copper with an atom of oxygen gives one molecule of copper oxide. In an analogous manner, two atoms of hydrogen and one atom of oxygen produce one molecule of water when they combine. Conversely, if a molecule of a compound, such as water, is imagined to be split up, the products would be the atoms of the constituent elements.

MOLECULES OF ELEMENTS

An important matter to consider is the difference between an atom

and a molecule of an element; it is necessary to distinguish between the smallest conceivable particle, i.e., the atom, and the smallest particle that can actually exist as a stable unit, i.e., the molecule. For example, it has been found that hydrogen atoms are incapable of any appreciable existence at ordinary temperatures; they combine in pairs to form molecules. In this case, therefore, the molecule of hydrogen consists of two atoms and is represented by the symbol H_2. Various physical and chemical methods are available for determining the number of atoms in a molecule of an element; without going into details, it can be stated that the molecule of the elements oxygen, nitrogen and chlorine, as well as hydrogen, to mention a few familiar substances, each contain two atoms in the molecule. The symbols of these molecules are thus O_2, N_2 and Cl_2, respectively. Not all the molecules of atoms contain two atoms, however. For some elements the atom is itself capable of independent existence; in such cases the atom and the molecule are identical. This is true for the vapors of many metals and for certain gases, such as helium, neon, argon, etc., which do not take part in chemical combination. The molecules of some elements contain more than two atoms per molecule; for example, phosphorus has four, and sulfur has eight atoms in the molecule at ordinary temperatures. The symbols of the molecules are thus P_4 and S_8, respectively. It should be clearly understood that although single atoms of these various elements do not exist in the free state under ordinary conditions, such single atoms may form part of a molecule of a compound.

MOLECULAR WEIGHTS

Just as the relative weights of atoms are expressed in terms of their atomic weights, so the relative weights of molecules are given by their "molecular weights." The molecular weight is always stated on the same scale as is used for atomic weights (see Part III); thus, the molecular weight of any substance, element or compound, is the weight of the molecule of the substance in terms of the weight of the oxygen atom, the latter being taken as 16.000. It has been stated above that the molecule of oxygen contains two atoms; hence the molecular weight of oxygen is 32.000 on the usual scale. It is thus possible to define the molecular weight of any substance X as its weight relative to that of the oxygen molecule, the latter having a value of 32.000; it follows, therefore, from this definition that

$$\frac{\text{Weight of 1 molecule of X}}{\text{Weight of 1 molecule of oxygen}} = \frac{\text{Molecular weight of X}}{32.000}. \quad (1)$$

This equation is very important as it forms the basis of a valuable method for determining molecular weights, which may subsequently be used for the derivation of atomic weights. The procedure for the estimation of molecular weights will be considered next.

AVOGADRO'S LAW

When Avogadro proposed the idea of molecules, he did so partly in order to account for certain observations that had been made in connection with the volumes with which gases react with one another. In order to explain the facts he put forward a suggestion which is now so widely accepted that it is known as Avogadro's law. According to this law, a given volume of any gas, at a definite temperature and pressure, always contains the same number of molecules, no matter what their nature. For example, if we take 1 liter of oxygen gas at a temperature of 20°C and a pressure of 1 atmosphere, it will contain the same number of molecules as 1 liter of hydrogen gas, 1 liter of oxygen gas, 1 liter of water vapor, or 1 liter of any gaseous element or compound, provided it is at the same temperature (20°) and pressure (1 atm.). Similar considerations would apply at any definite temperature and pressure. Because gaseous molecules are too small to be observed and counted, there is, of course, no direct proof of Avogadro's suggestion, but there is so much convincing indirect evidence that it is regarded as one of the accepted "laws" of chemistry.

MOLECULAR WEIGHTS AND DENSITIES OF GASES

The density of any substance is defined as the weight of a unit volume of that substance; because gases have such small densities, the volume is generally taken as 1 liter, so that the density of a gas is the weight in grams of 1 liter. Since the volume of a given weight, and hence the density of a gas depends on the temperature and pressure, it is necessary to specify the temperature and pressure at which the density is determined. Consider 1 liter of each of two gases, at the same temperature and pressure; suppose one of these gases is oxygen and the other is any other substance X. According to Avogadro's law, given above, these volumes will contain equal numbers of molecules; suppose this number is N, in each case. The weight of 1 liter is equal

to the density, and so it follows that the weight of N molecules is equal to the density of the gas; thus,

Density of gas X = Wt. of 1 liter of gas X = Wt. of N molecules of X, and

Density of oxygen = Wt. of 1 liter of oxygen = Wt. of N molecules of oxygen.

Dividing one of these expressions by the other, it is seen that

$$\frac{\text{Density of gas X}}{\text{Density of oxygen}} = \frac{\text{Wt. of } N \text{ molecules of X}}{\text{Wt. of } N \text{ molecules of oxygen}}.$$

The ratio of the weights of N molecules of the given substance to N molecules of oxygen is, obviously, equal to the ratio of the weights of one molecule of each of these two substances; hence,

$$\frac{\text{Density of gas X}}{\text{Density of oxygen}} = \frac{\text{Wt. of 1 molecule of X}}{\text{Wt. of 1 molecule of oxygen}}.$$

If this result is compared with equation (1) it is seen at once that the weights of the molecules may be eliminated so as to give

$$\frac{\text{Molecular Weight of X}}{32.000} = \frac{\text{Density of gas X}}{\text{Density of oxygen}}. \qquad (2)$$

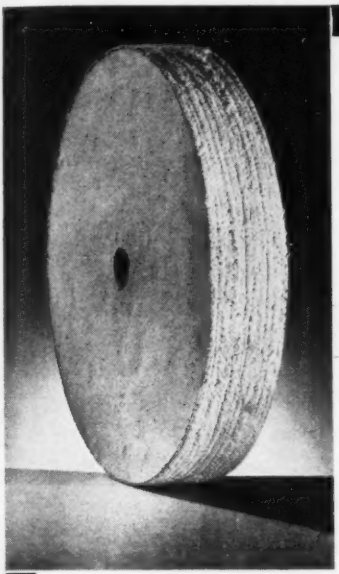
This expression provides a simple and direct method for determining the molecular weight of a gaseous substance. All that is necessary is to measure the density of the gas, that is, the weight of 1 liter, and to compare it with the density of oxygen at the same temperature and pressure. For example, it was found that at a temperature of 0°C and a pressure of 1 atm., the weight of 1 liter of ammonia gas is 0.771, while at the same temperature and pressure 1 liter of oxygen weighs 1.43 grams. The molecular weight of ammonia is then given by equation (2) as

$$\frac{\text{Molecular weight of ammonia}}{32.000} = \frac{0.771}{1.43}$$

and consequently,

$$\text{Molecular weight of ammonia} = \frac{0.771}{1.43} \times 32.0 = 17.2.$$

The same principle has been used for obtaining the molecular weights of many gases and of various substances that can be converted into gases, without decomposition, when heated. A number of different methods have been devised for measuring the densities, but these need not be considered here.



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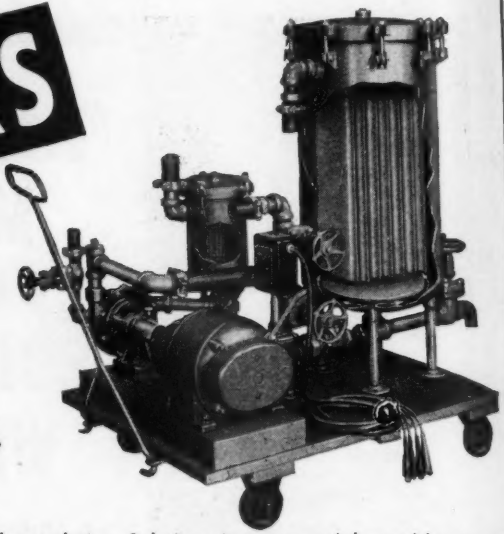

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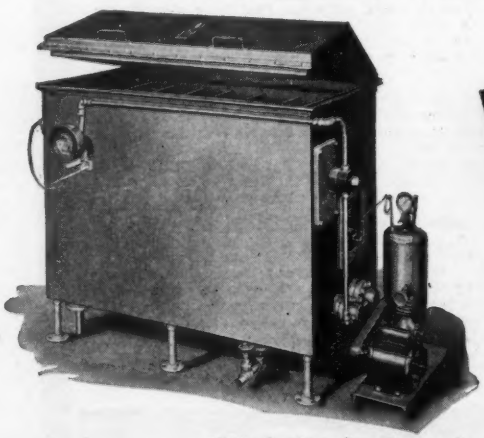

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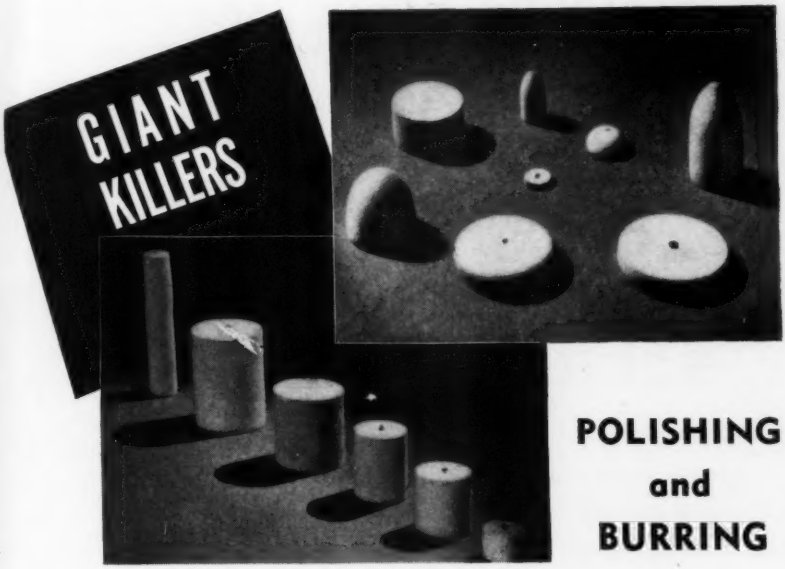

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RECTIFIER ENGINEERS

EST. 1892

Oxide Black Finishes on Steel

By
JEROME BLACK

A GREAT deal of hocus-pocus has surrounded the oxide black finishes on steel. Fantastic claims for their performance have been made. Many reasons for this exist—a discussion of which is not necessary for the purposes of this article. It is intended here to cover the operating characteristics and compositions of some solutions which are being used commercially. Some idea of performance and other characteristics will be covered.

There has been a wide acceptance of this finish in certain ordnance and aircraft work as well as in civilian work where the freedom from critical materials has given it impetus. Much of this acceptance has been due to the promotion by various manufacturers of proprietary salts and to a lack of thorough testing of the claimed performance by the users whose laboratories have been overburdened with work.

Recent ordnance specifications have quite correctly evaluated the corrosion resistance of the coating by calling for a standard salt spray test of one-half hour on unoiled coatings and two hours on oiled coatings. Outdoor exposure tests normally give rust in from four to seven days in normal temperatures and humidity. Oiled coatings vary considerably on outdoor exposure but generally speaking, the black finish has little effect compared to the difference between oils.

Many of the other properties such as lubricating properties and wear-resistance are also of doubtful value. The supposed porosity of the black oxide coating is usually belied by the photomicrographs which show less porosity than the original steel. This, of course, does not mean that no benefit is derived from the coating but that many of the claimed advantages should be minimized.

Thickness of the coating is also a matter of much confusion. Tests have shown that the thickness as normally applied does not exceed 30 to 40 millionths of an inch. Owing to the margin of error in the salt spray and the difficulty of making accurate determination by most of the standard methods, comparative tests of black oxide finishes have been almost non-existent. One method which holds

promise is the use of a sulfuric acid solution containing copper sulfate. A drop of the solution is placed on the unoiled coating and the time necessary for the appearance of a copper immersion spot is noted.

The oxide black coatings have sometimes been compared to Parkerizing but any critical comparison shows clearly a different characteristic of coating. A great deal of misinformation exists concerning the origin of this type of finish. The use of a molten salt bath to produce black oxide finishes is comparatively old and still is used whenever a heavy oxide coating is required. The present type consisting of a highly caustic concentrated salt solution boiling at 250-300°F. is of more recent development. Isolated instances of the use of such a solution during the first World War have been reported but means of controlling the solutions were poor and the use apparently dropped after the war. Private communications report the use of one of the current types of solution in 1933 and 1934 but this was also dropped due to the disadvantages of the coating for the use to which it was put. Since that time the conditions of operation have become more thoroughly understood and the use has expanded although its use was very limited until the advent of shortages of common coating metals.

An understanding of operating conditions is extremely important for successful operation with good results over an extended period of time. Foremost in successful operation is temperature control. The temperature must be uniform throughout and kept within a very short range, usually about two degrees. When a solution is new or immediately after a heavy salt addition, this range is considerably extended. A new solution will usually give a good black at a temperature of 15 to 20 degrees below the stable operating temperature. The cause of this has not been thoroughly explained but is due to the accumulation of iron in the solution, both in the form of soluble salts with caustic and as insoluble iron hydroxides. Devices which will remove the insolubles while the solution is operated are in fairly common use and obviate the necessity of periodic removal of sludge from the bottom of the tank. No exact operating temperature can be given as this varies with the type of steel being treated and whether a one or two-tank process is used. For single tank processes on most low carbon steel not having a passive surface, the operating temperature is usually 295-298° F. Temperatures below 290° F. usually will not give a satisfactory black and temperatures over 300° F. result in the

formation of red oxide of iron which is one of the worst troubles encountered in the operation. The best remedy is to operate at a temperature about 2° below the point of red oxide formation. If the temperature is dropped very much below this point, tests as previously outlined show considerable drop in resistance and a marked lessening in intensity of black.

The control of the red oxide of iron is the most important factor in operation of the blacking solution. As previously mentioned, the surest control is thru operation at the proper temperature which is slightly below the temperature of formation of the red oxide. The formation of red oxide occurs at a definite temperature which varies with the analysis and treatment of the steel involved and also with the thickness of section being treated. Alloying constitutents such as nickel and chromium raise the blacking temperature. Large reduction in rolling and other operations cause a passivation of the surface which raises the blacking temperature. Very thin sections such as fine wire and thin sheets will black at lower temperatures than with normal sections as encountered in machined parts and stampings. In all these cases the temperature of formation of red oxide follows the blacking temperature. Because of the desire to process different types of work at the same time, various addition agents have been added to the solutions to prevent the formation of red oxide. Among the most successful of these is the addition of cyanides. While they are supposed to form ferrocyanides and thus remove the iron, this explanation does not explain the formation of ammonia and it seems probable that the true explanation depends on the powerful reducing properties of the cyanide. Other addition agents are of less effectiveness and their use is invariably uncertain in effect.

Operation of two-tank processes is subject to the same operating characteristics as in the single tank processes. The essential idea is the use of two processing tanks, the first of which is operated at a minimum temperature and the second at a maximum temperature. In some cases the parts are rinsed between the two processing tanks but many installations provide for direct transfer. Thru the use of two processing tanks, it is possible to finish with a higher temperature than is possible with a single tank process. The first tank is usually operated at a temperature well below the temperature of red oxide formation, say 285-295° F. and the second tank at a temperature of 295-305° F. The

first tank apparently passivates the surface allowing the use of the higher temperature without trouble. Properly operated it is sometimes possible to secure more uniformly dark results with the two stage process. Patents have also been granted covering the use of a three-step process.

Somewhat different salt compositions are recommended for each of these methods which will be discussed later. Several patents have been issued on the production of black oxide finishes. The two most worth mentioning are U. S. Patent #2,192,280 issued March 5, 1940 to Whalen & Wilbur and #2,077,450 issued April 20, 1937 to Weisberg & Corman. The first concerns a two-tank process in which the second tank is maintained at a specified temperature above the first tank. The second patent concerns the addition of various materials, notably cyanides for the purpose of maintaining the solution in operating condition and eliminating the danger of red oxide formation.

Probably of primary interest to those concerned is some idea of the composition of the solutions involved. Much mystery has been made a feature of these solutions by the vendors. Their simplicity is reason enough for the smoke screen thrown up. Briefly, the salts consist of 50 to 80 percent caustic soda with the balance oxidizing agents of which three are almost commonly used. These three are the sodium or potassium salts of nitrates, nitrates and chlorates. Effects of these will be discussed later. The use of caustic soda is universal throughout the commercial salts. Caustic potash is roughly double the price of caustic soda and appears to offer no particular advantage.

The earlier materials in use used mixtures of nitrates and nitrates as the oxidizing portion of the salts usually in a combined amount of 30 to 40 percent, which amount is not critical. Potassium nitrate was commonly used but commercial trials have shown the sodium salt to be fully as effective and much cheaper. Either sodium or potassium nitrate may be used. Thus, the full formula of a typical material might be as follows:

Caustic Soda (sodium hydroxide)	66
Sodium or Potassium Nitrate	17
Sodium Nitrite	17

In many cases in order to disguise the raw materials or to promote ease of handling and eliminating the deliquescent effect of caustic

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soda, the material is fused and poured into molds and sold as blocks. This fusing in no way changes the characteristics of the material for its final use. The amounts shown are only typical and the proportions of any of the ingredients may be varied over a considerable range without noticeable change in the blacking operation.

While this type of material is perfectly suitable for use in a single tank blacking operation, it is especially well suited for use in the two-tank process and gives the best possible results as the solution will withstand high temperature breakdown better than some other formulations. Especially on work hardened and passive steels, this formulation also does not give as black a finish as some of the other compositions, but the slightly lighter finish is as good as any so far as corrosion resistance goes.

The extreme case where only caustic soda and sodium nitrite is used, is also a good usable composition and in some cases, at any rate, gives a blacker result than the composition using nitrate. A commercial salt of this type contains 60 percent caustic soda and 40 percent sodium nitrite. Something over 1 percent sodium chloride was also present in this material, probably as an impurity in the caustic soda. No function of the chloride could be determined in laboratory tests though it may help in overcoming passivity of some steels. This composition is recommended as a single tank process.

A second type of composition of salts might best be typified by the following formula:

Caustic Soda	80%
Sodium Chlorate	20%

This type is recommended for use in single tank cycles only. It appears to be somewhat more critical than some of the other types and must often be operated at a temperature about 5° below the other types. Considerable breakdown also is apt to occur and the solution may have to be discarded at intervals if the additions are not adequate to maintain a considerable quantity of fresh salts in the solution.

A combination of these two types is one of the newer additions to the hosts of different salts and apparently gives excellent results in single tank processes. A typical formula is as follows:

Caustic Soda	70
Sodium Nitrite	29
Sodium Chlorate	1

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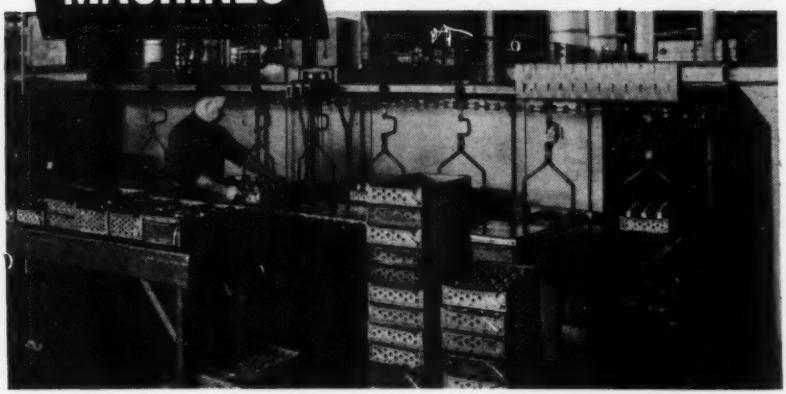

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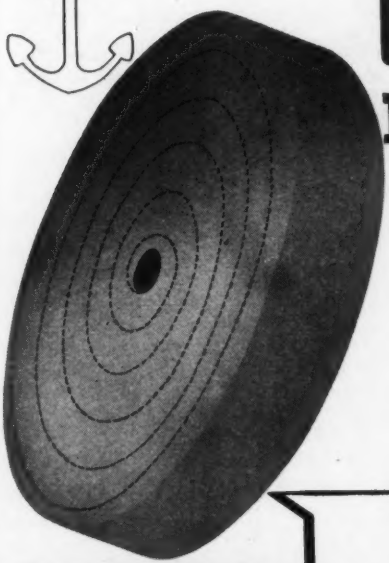
The function of the sodium chlorate is apparently to activate the passive condition of some steels and also to provide additional oxidizing power. The general characteristics make this about the most desirable for single tank operation.

The formulas given above are not necessarily the exact formulas used in the various proprietary mixtures but are typical and are chosen after an analysis of the major portion of those now being marketed. The analysis of the various mixtures is not complicated but must be performed by a chemist who is familiar with nitrates and nitrites and the impurities which may be found in them. No responsibility can be taken for successful performance of any of these but they have all been used in commercial production long enough to demonstrate their suitability.

As a part of the operating characteristics, the time of immersion is important. Recommendation of suppliers are not reliable. Recommendations vary from about five minutes up to an hour. A number of tests were run on the different types of solutions in both one and two-tank processes. The general conclusions that were reached as a result of this are as follows: In a single tank process the color was usually good in less than ten minutes but the coating increased in resistance with time, reaching a maximum between twenty and thirty minutes and then falling off slightly with longer immersion. On some low alloy steels and under some special conditions these conclusions are not valid but such exceptions are individual cases and must be treated accordingly.

With two-tank processes, the situation is somewhat different. While a uniform time in each solution is ideal from a production cycle standpoint, the results show that this results in wasted time. A series of tests were run on cycles using equal times in each tank and a maximum was found to be reached at about twenty minutes. When the time in each tank was varied, the results were very interesting. With a time of ten minutes in the first tank, the maximum was reached in the second in about twenty to twenty-five minutes. When the time in the first tank was cut to five minutes, trouble was encountered in the second tank with red oxide formation on some sample but others processed satisfactorily and required about twenty minutes for maximum resistance.

All of the above tests were made using the acid test previously



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described with the time necessary for breakthru used as a measure of resistance. With the acid used and at the room temperature, the time necessary for breakthru varied from a few seconds to as high as 6 minutes. Whenever the black was covered with a red oxide, the result was not recorded although in one case this was brushed off and the coating underneath found to be extremely resistant.

No mention has been made of processing equipment as this is a complete story in itself. The use of different types of oil is also beyond the scope of this paper. One little trick which has proved of value is the use of chromic acid in the hot water rinse following the blacking operation. A cold rinse is, of course, used first. This chromic acid dip improves the corrosion resistance of the black on exposure to outdoor conditions.

It would not be amiss to say a word about cleaning of the parts before blacking. No acid dips are usually used except where rust must be removed and then it is preferable to go back into an alkaline cleaner before the blacking operation. Parts must be completely clean or a satisfactory black will not be obtained. The cleaner used should not be too highly alkaline and at too high a concentration or some of the parts may fail to blacken.

No discussion of exact operating methods has been made as this has already been covered by other authors and the dangers of these solutions are too well known to need comment.

Depending on the exact formula used, 7¼ to 8 lbs. of salts are required for each gallon of final solution for a boiling temperature of 295-298° F. The boiling temperature is an exact indication of the amount of salts in the solution. The solutions must always be used at the boiling point to secure uniform results. The boiling point changes due to evaporation of water only and may be corrected if too high by the addition of water. If too low, salts may be added or the solution allowed to bill until the temperature rises to the desired point. Racking of work is sometimes a problem as is the processing of large bulky pieces which may have a tendency to lower the temperature when they are immersed. These and many other operating problems are best solved thru experience in actual trial runs. No attempt is made to discuss all of the difficulties encountered in operation as an intelligent operator can easily detect difficulties and remedy them.

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INDUSTRIAL FINISHES

Ventilation of Electroplating Departments

By
CARLYLE ARTRAN

THE kind of ventilation system commonly seen in electro-plating departments is of the exhaust type—so named because air is sucked, rather than pushed. The most conspicuous part of an exhaust system from within the department are the hoods, where the air is sucked into the pipes. These hoods may be shaped in many ways but all hoods follow definite laws of performance.

An open end of a pipe is the simplest hood. It is also one of the least efficient. The reason is that it does not make any provision for the laws governing air in motion. It is, relatively, about as refined as an airplane wing shaped like a wedge. Perhaps such a wing could be made to fly, but only at great sacrifice of power and maneuverability.

Hood forms have been explored and the basic forms have been evaluated. The unit of measurement of hoods is named the Coefficient of Entry and is written C_e. For an open pipe end C_e is 72 percent.

One of the laws governing a moving object is that it tends to move in a straight line. Theoretically it will—in practice some outside force is always stepping in to give it a curved flight. This happens to the air rushing into an open pipe end. The air comes not only from directly in front of the opening but from the sides as well. If you had a transparent pipe and colored air you could see a crowding effect a short distance in from the end of the pipe. This crowding will progress only so far—then the air will expand and fill the entire pipe section. If the area where the air column has the smallest cross section is measured and is then compared to the cross section of the pipe, it will be determined as being somewhat less than 100%.

If a piece of equipment costs $70.00 wholesale, and the trade discount is 30%, obviously the list price is $100.00. Applying this reasoning to the open pipe end: if the C_e is 72/100th the discount is 28%. If you are in the market for a hood, you naturally want one

with the smallest discount because this represents the distance your hood will fall short of 100% efficiency.

The commonest method to improve the performance of the open pipe is to add a taper. If the taper is not too short or too abrupt, the C_e will be increased to about 0.80. This shows a saving of 8% and certainly is a step in the proper direction.

Sometimes, for various reasons, it is not possible to use a taper. It may, however, be feasible to flange the pipe end. The C_e then becomes 0.82. This hood form finds widest application on woodworking machines.

Electro-plating tank hoods of the rim slot type are relatively inefficient, but this shape is dictated by the operations of loading, unloading, and moving the work from tank to tank. The probable C_e of the average tank hood drawing air through narrow slots along the two sides will be in the neighborhood of 40%. By careful design this value can, however, be raised to about 60%.

When compressed air is blown through a nozzle, as is common practice in plating rooms, the air carries some distance at considerable velocity. If the direction of air travel is reversed so that the air is drawn into the hose, as with a vacuum cleaner, the effect of the draft is apparent for only a very short distance from the end of the hose. The accompanying chart shows this decrease in velocity and the extreme rate at which it occurs. Beyond the 50% D line the velocities are closely inversely proportional to the squares of the distances from the plane of the hood face. This explains the difficulty of reaching out with an exhaust hood to influence fumes or dust any great distance from the hood face.

After the air carrying fumes or dust enters the hood it must travel through a pipe to the fan, dust separator, or fume condenser. The design of piping has been thoroughly investigated and complete design data is available. The construction of piping, however, is another matter and too often details are left to the discretion of a mechanic who is not so much concerned with proper air flow as with how a fitting will cut from a sheet of metal.

The greater the velocity of air in piping, the greater resistance it encounters and the greater the power requires to move the air. The greater the air velocity, the smaller the pipe size and the smaller the cost of the metal. The difference in labor costs between small and large

piping, however, is not directly proportional to the size. The difference in fabricating and erecting 28 inch diameter as against 14 inch diameter piping does not approach a 2 to 1 ratio.

For fume or dust ventilating systems in industrial plants the use of round pipe rather than rectangular will be found more practical. At fittings where the air must change direction or velocity the change should be effected as gradually as cost and space limitations will allow. The entire piping layout should be made by a competent engineer and the drawings should be adhered to.

The machine which actually causes the air to move is, of course, the fan. This may be of several types. Generally speaking, the propeller fan will move more air per dollar cost for equipment and operation than the centrifugal types. The propeller fan has less ability to overcome resistance, however, and its use is not usually recommended for Static Pressures over 1 inch water gauge.

Centrifugal fans are divided into three general classes with impellers having the following characteristics: Multiblade forward curved blades—Non-overloading backward curved blades—and straight blades of the paddle wheel type.

The multiblade fan will handle a large volume at moderate resistance and finds its widest application in the heating and ventilating and air conditioning fields. It is not the best choice for handling corrosive fumes or abrasive dust because of its large number of light gauge blades and the manner in which they are fastened.

The backward curved or backwardly inclined fan has fewer blades made of heavier gauge metal than the multiblade and can be applied successfully to fume exhaust problems. Standard Class I construction fans may be used up to about 2½" S.P. Class II construction should be used above this resistance up to about 6" S.P. An all-welded housing is important when handling such fumes as chromic acid as folded seams or bolted joints will leak.

The paddle wheel fan will handle air up to pressures of about 16 inches water gauge at maximum mechanical efficiencies in the neighborhood of 70%. It has the ability to handle all sorts of airborne material directly through the fan and for this reason is universally used to ventilate grinding, buffing, and polishing wheels. The older design exhausters use cast steel wheel spiders with steel plate floats and have seamed, riveted or bolted housings. Newer designs

embody all welded construction which makes for fewer obstructions to air flow within the fan and less possibilities for leaks.

A propeller fan tends to load its motor when resistance to air flow is imposed. Multiblade forward curved fans tend to unload the motor with increased resistance. Backward curved fans tend to unload the motor with increased resistance but have inherent pressure rising characteristics which makes them non-overloading. By taking advantage of this feature, it is possible to choose motor horse-power for the design fan speed so that with a wide-open fan the motor will not be overloaded. This is a valuable consideration for systems equipped with dampers or for systems subject to changes or additions where the original design resistance may be lowered.

Generally, belt driven fans are more versatile of application than direct connected fans. If a different fan speed is required, belt sheaves may be easily and cheaply changed to suit, but standard AC motor speeds are set at 3600-1800-1200-900-720 and 600 on 60 cycle; and 3000-1500-1000-750-600 and 500 on 50 cycles. With modern vee belts a properly chosen drive will give years of efficient service.

In addition to the above fans we have positive displacement fans using sliding vanes or lobe shaped impellers for operating against high pressures. The common employment of such fans in plating work is found in air agitation of tank solutions.

There also is the axial flow propeller fan which will handle volume against moderate resistance with low horsepower. This fan has non-overloading characteristics and may be belt or direct connected to the motor. The pre-war design used an aluminum alloy blade but much research has been done on this fan type for marine ventilation making use of light-weight hollow steel blades. Post-war fans capable of operating against a resistance of 20 inches water gauge are not improbable.

The subject of dust collectors is a very large and vague one. Most cyclones are produced by rule of thumb, then doctored after the system is in operation. It is possible to predict the operation of a cyclone, but all factors must be known beforehand. The cyclone is the cheapest and most effective means of collecting common dusts encountered in industry. In the larger sizes it will not separate very fine particles such as talc, but is used effectively on grinding, buffing and polishing dust. The resistance of a well designed cyclone should be not over ½" water gauge.

The ventilation of motor generator rooms is an obscure subject usually solved, if at all, by the installation of a $15.00 exhaust fan in the sidewall. Inasmuch as the generator is the most expensive single item in a plating department, it would seem logical to take out insurance in the form of a dust and temperature protective ventilating system. One of the most successful systems for generators consists of efficient air filters, an inexpensive multiblade fan and drive, piping to carry the air to the windings and commutator and properly sized relief air openings for the room or enclosure. The room should be kept under a slight pressure at all times to prevent the infiltration of dust and fumes and the fresh air location should be carefully chosen to secure the coolest, cleanest air. For large installations the addition of evaporative cooling will pay dividends.

In order to protect the exhaust fan operating on chrome plating tanks it is wise to insert a separator in the pipe before it connects to the fan inlet. These separators may be of the inertia trap or the centrifugal type. The latter is to be preferred as it requires less fan horsepower and is equally effective in protecting the fan impeller and housing against the chromic acid particles. The separator will also reduce the amount of corrosive particles thrown into the atmosphere, thus saving other departments or other establishments from this hazard.

For high production plating plants the addition of an after-condenser may be indicated. This condenser, as a rule, uses water to clean the exhaust air of chromic and other acid particles and fumes, and employs either sprays, straight impingement, or wetted pads of glass or other fibres. The cost of such equipment is warranted for large plants housing expensive machine tools or for locations where fume discharge must be at a minimum.

In conclusion, I wish to mention the published findings of Mr. J. M. Dalla-Valle and Mr. John L. Alden.

CONTROL YOUR PLATING SOLUTIONS

KOCOUR TEST SETS

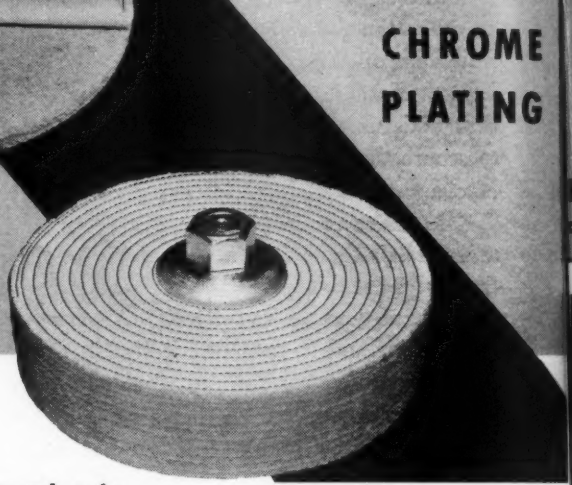
KOCOUR CO. • 4725 S. CHRISTIANA AVE. • CHICAGO

Sisalin Sections

PAT. NO. 2108985

BEFORE AND AFTER HARD CHROME PLATING

Sisalin Section showing muslin ply and Sisalin ply, which are alternated.



Complete wheel of Sisalin Sections.

Sisalin Sections have proved to be the fastest and most satisfactory cutting medium ever used for preparing steel surfaces prior to hard chrome plating.

1. Remove minor imperfections from base metal and in some instances cut so fast as to also remove rather deep scratches.
2. Are almost impossible to scorch regardless of the severity of pressure or speed.
3. Can be run at slow speeds or at speeds as high as 3500 R.P.M. with 16" diameter sections.
4. Permit the operator to readily see the degree of finish when used with such rouges as 6/D/46, 6/M/161 or 6/M/266.
5. Are also used after chrome plating to remove burnt chrome and produce a high finish.

Sisalin Sections are available for prompt shipment in a wide range of sizes and additional performance information can be furnished by H-VW-M Field Engineers.

HANSON-VAN WINKLE MUNNING CO. · MATAWAN, NEW JERSEY U.S.A. · SINCE 1820

Manufacturers of a complete line of electroplating and polishing equipment and supplies

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MATAWAN, NEW JERSEY

PLANTS: . . . Matawan, New Jersey • • Anderson, Indiana • • Bridgeport, Connecticut

SALES OFFICES: . . Anderson • Bridgeport • Chicago • Cleveland • Dayton • Detroit • Elkhart • Matawan

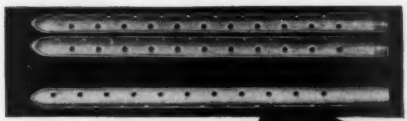
Milwaukee • New Haven • New York • Philadelphia • Pittsburgh • Springfield (Mass.) • Syracuse

S-B PROCESS
FOR VERSATILITY IN ZINC PLATING

The Hanson-Van Winkle-Munning S-B Zinc Plating Process is unsurpassed for versatility. Its operating range is unusually wide.

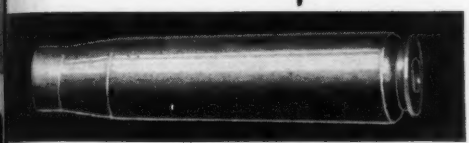
This high speed, alkaline, all-purpose solution produces pure satin-bright to bright electrolytic zinc deposits which are highly protective.

HERE IS EVIDENCE
of S-B Process versatility



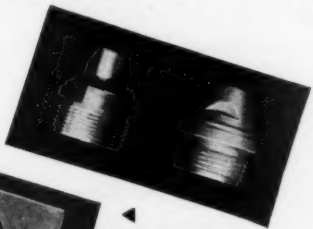
▲ **THROWING POWER** . . . Without the use of an auxiliary anode, this 10-inch primer tube receives a deposit .0003 inches on the outside and .0001 inches inside.

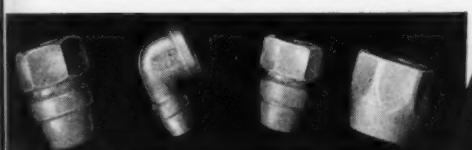
BRIGHTNESS . . . a wide range of operating characteristics makes possible bright lustrous deposits suitable for future consumer goods. The clear, uniform surface obtained aids in the inspection of war materiel. ▶



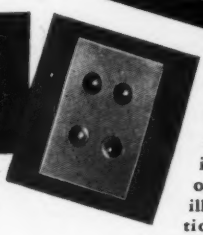
◀ **ADAPTABILITY** . . . This 20-mm. steel shell case has been given a chromate film over the S-B zinc deposit. Phosphate and other chemical films are commonly applied subsequent to the zinc deposit.

ARMY AND NAVY SPECIFICATIONS . . . S-B Process electrolytic zinc deposits meets all Army and Navy specifications. ▶





PLATING CASTINGS . . . A modification of the S-B ion permits zinc plating on malleable and grey castings.



◀ **DUCTILITY**
S-B Process zinc plated steel will withstand drawing, bending and forming operations. Cupping tests illustrated show deformation to point of rupture without peeling.

Are you considering a new zinc plating installation — a conversion from cadmium to zinc? Our nearest representative will be glad to give you full details on the S-B Process for all-purpose zinc plating.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

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5105

KOCOUR CONTROL SETS

Kocour Company has for some time offered to the industry sets for controlling Alkaline Zinc and Cadmium plating solutions, in regard to metal, cyanide, caustic and carbonate content. New improved procedures now enable one to obtain accurate zinc and cadmium metal readings, even in the presence of iron which has, in the past, tended to alter results obtained. Provision is also made to eliminate the inaccuracy made by the presence of molybdenum used as a brightener in some zinc solutions.

NEW LUMINAIRE FOR INDUSTRIAL LIGHTING

Designed for easy continuous strip installation, a new light-weight Fluorescent Luminaire with one-piece, double-length hood and two full-size reflectors is announced by Westinghouse Electric and Manufacturing Company.

Available for use with four or six 40-watt or four 100-watt Mazda F lamps, the new Type F N C luminaire is the equivalent of two conventional units. The hood is fabricated from sheet steel with all ballasts, lamp holders, and starter sockets mounted and wired as part of the channel assembly. New sliding hangers permit suspension from any part of the hood. Mounting arrangements are available for any application.

The moisture-resistent, non-metallic reflectors are covered with a multi-coat polymerized finish which provides a reflection factor of 85

per cent or more. Wing-lock permits easy removal of reflectors for cleaning.

Further information may be secured from the Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio.

KREMBS OFFER FLUXINE CHART

Anyone interested in welding, brazing or silver soldering will find considerable use for the new Krembs Fluxine Chart . . . a handy key to finding the best flux to use in connection with a host of metal-joining jobs. The Chart comes in bulletin form, is easy to use and is handy for reference. It gives a list of all the common metals and alloys—and many of the rarer ones—and recommends the most satisfactory flux to use when joining them by different processes. It is sponsored by an organization of welding, and brazing consulting engineers, recognized as authorities in their field. Men engaged in metal-working may obtain a complimentary copy of this chart by writing on their company letterhead to Krembs and Company, 676 West Ohio Street, Chicago 10, Ill.

NEW ITEMS BY ENTHONE

NEW ALKALI STEEL CLEANER

The Enthone Company, 442 Elm St., New Haven, Conn., has announced the development of a new alkali material for cleaning of steel called Cleaner 100.

This product is used in a concentration from 4-8 oz./gal. in the temperature range from 180-212°F. It is stated to have very high detergency and was designed for cleaning of steel. It is best used anodically, but it is also claimed to be a very effective immersion cleaner.

Advantages claimed for the product include excellent rinsability, very long life due to buffering and selection of surface active materials.

Cleaner 100 contains no soap such as rosin soap, but contains complex phosphates to solubilize any fatty acid soap that may form from greases and oils being cleaned. The Cleaner is effective in soft and very hard water and does not form insoluble residues due to reaction with acids.

A bulletin is available describing the features of Cleaner 100.

ACID ADDITION AGENT

The Enthone Company has recently published a four-page bulletin in color describing their product "Acid Addition Agent" which is used in sulphuric, hydrochloric and other non-oxidizing pickles to promote better pickling. Advantages and use of the product are described in detail. For a copy write to The Enthone Co., Dept. MR.

HARD DRYING RUST-INHIBITING WAXES

A four-page bulletin in color has been issued by The Enthone Company describing emulsion waxes available to the metal treating industry. These waxes are applied at room temperature and form adherent, hard, rust-inhibiting films upon the metal. For a copy write to The Enthone Co., Dept. MR.

CLEANER 100

The Enthone Company has just published a four-page bulletin in color describing a new alkali steel cleaner called "Cleaner 100." This cleaner is designed for cleaning of steel by either immersion or electrolytic means. Advantages of the cleaner are outlined. For a copy write to The Enthone Co., Dept. MR.

PURE WATER FOR ELECTROPLATING

A new process has been developed for the purification of water to replace distilled water, at a fraction of the cost. This process will produce "de-ionized" water fit for any chemical or industrial purposes. It is a development of the Illinois Water Treatment Company.

There has never been a time when the electroplating and metal finishing industry has been more conscious of the need for pure water. It is now known that many formerly mysterious troubles in the plating plant were caused by impure water. De-ionized water, which contains from two to ten parts per million of dissolved solids, and is comparable to single-distilled water, is eminently suitable for electroplating operations.

The Hanson-Van Winkle-Munning Co., of Matawan, N. J. has been appointed sales representative for this process in the metal finishing industry, and is prepared to furnish full preliminary information to manufacturers operating electroplating plants who are interested in the use of a pure water for their operations.

INDUSTRY NEWS

GRAHAM SUCCEEDS DWYER

Michael B. Dwyer, District Sales Manager in charge of the St. Louis Office of the Pennsylvania Salt Manufacturing Company, has retired from active duty with the Company as of December 31, 1943. Mr. Dwyer, who is held in the highest esteem by his associates in the Company as well as by many hundreds of customers and business acquaintances in the St. Louis area, closes a most enviable record of 58 years of active duty with the Company which is one of the country's largest and oldest manufacturers of heavy chemicals and chemical specialties.

Donald W. Graham, who has been with the Pennsylvania Salt Manufacturing Company for 13 years, comes from the Chicago Office to succeed Mr. Dwyer as District Sales Manager at St. Louis.

WALTER LINLEY HAGUE

Walter Linley Hague died on Dec. 17, 1943, at his home in Pittsburgh, Pa. He was 71 years of age.

Mr. Hague, who had spent the last few years in retirement, was one of the pioneers in the contract and jobbing electroplating industry, having operated Walter E. Hague and Son, Inc., which had been founded by his father, Walter Edward Hague, in 1869. This company was in continuous operation for over 65 years, until Mr. Hague's retirement. He was widely known not only in the Pittsburgh district, but also nationally, having taken an active part in the work of the American Electroplaters' Society.

Mr. Hague leaves a widow and a son, Louis M. Hague who is Vice-President in charge of sales of the Hanson-Van Winkle-Munning Co. of Matawan, N. J., manufacturers of electroplating equipment and supplies.

COWLES RESEARCH EXPANDS

The Cowles Detergent Company announces the appointment of Dr. Clinton W. MacMullen as Technical Director, in charge of the Company's rapidly expanding research and technical service programs. A graduate of the University of Minnesota from which he also received his Doctor's Degree, Dr. MacMullen comes to the Cowles organization from the Rohm & Haas Company.

Other recent appointments to the Cowles research and laboratory staffs are: Daniel A. Cook, who graduated in Chemistry from the Massachusetts Institute of Technology, and has had extensive experience in the textile chemistry field and comes to Cowles from the North American Rayon Corporation; Ruth Mary Marsh, who received her undergrad and post-graduate degrees in Chemistry and Physics from the University of Chicago; and Cornelius W. Pettinga, formerly of the faculty of the Chemistry Department of Syracuse University.

ANNOUNCEMENT

Effective January 1st, 1944, Messrs. Walter W. Kempf and Joseph F. Bolish, partners trading under the firm name and style of Lacquer Finishing, will engage in the business of treating and finishing metals, etc., theretofore conducted by Lacquer Finishing, Inc., a New Jersey corporation.

LUPOMATIC APPOINTS W. D. MacDERMID

The Lupomatic Machine Company of New York announce the appointment of the W. D. MacDermid Chemical Company of Bristol, Conn., as their distributors, of all products, processes and compounds, in Connecticut and Massachusetts. The Lupomatic Company has been engaged in this specialty for over thirty years and has accumulated a large number of procedures on deburring and barrel rolling cycles. It is believed that this new contact will more completely concentrate the two companies' joint efforts in the metal finishing field.

BARTLETT RETIRES

The Pennsylvania Salt Manufacturing Company of Philadelphia announces the retirement of North Emory Bartlett as Vice President effective December 31, 1943. Mr. Bartlett, who is a native of Easton, Maryland, started with the Salt Company, November 10, 1894, as a

lye salesman in the Chicago Office. He came to the Philadelphia Office about 30 years ago as Special Sales Agent and on January 1, 1925, was made General Sales Manager of the Company. January 1, 1928, he became Vice President in charge of sales and continued actively in this capacity until January 1, 1942, when he relinquished his duties in charge of sales but remained Vice President with additional duties as Assistant Secretary and with other special duties.

Mr. Bartlett leaves the Pennsylvania Salt organization to retire to his home on the Miles River, just outside of Easton, Maryland.

ANNOUNCEMENT

Frank K. Foy, formerly with MacDermid, Incorporated, announces the formation of his own company which will be known as the Foy Electro-Chemical Company. The company will manufacture industrial cleaning materials, and in addition will supply industrial chemicals and equipment for use in the metal finishing field.

Office address: P. O. Box 164, Ansonia, Conn. Factory address: 680 S. Main St., Seymour, Conn.

To help you Solve your Problems

A new catalog on Blakeslee Degreasers. A 24 page book describing these fast, efficient degreasers, the many standard and special applications and the reasons Blakeslee Degreasers are the most economical in operation.

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THROUGH SCIENCE TO VICTORY

ONE noteworthy result of our effort to conquer the mad dogs of this warring world is the improvement in the production methods in all lines of supply through the application of modern science.

We are proving out now these applications which when the War is won will be of great assistance in producing more efficiently our many peace time requirements. It is not too soon to be thinking of these new possibilities in the improvement of our products from the standpoint of quality and production economy.

Those of our group who are fortunate in being able to perfect new applications should stand ready to share them with their brother members by preparing to tell about them at the Cleveland Conference next June. If our qualifications prevent our appearance as a speaker on the Educational Program we can at least enter into the discussion of the papers presented there or in some of the after meeting groups explain how you licked some production bug or saved material and time through the new effort. Come to Cleveland prepared to give and be surprised by how much more you will take back to your job after attending the Conference.

Speaking of giving, it is well to give some thought now about your hotel requirements and prepare to make the necessary reservations at as early a date as possible. This is the era of priorities and your priority rating on accomodations at the Hotel Cleveland will be governed by how early you make application.

Next month we plan to give you detailed information relative to Hotel rates and accomodation, also to whom you are to apply for reservations. Our Ladies Committee is in full swing making plans for the comfort and entertainment of any ladies who plan to accompany you to Cleveland.

How do you select this thin coating that means so much?

MAXIMUM PROTECTION WITH A MINIMUM RECOATING COST—that's what you look for in a rack insulation material. And it's easy to judge your present material against these standards which both Unichrome "Air Dry" Rack Coating and Unichrome Coating 202 measure up to:—

SAFE – Contain no ingredients harmful to plating solutions.

TOUGH – Withstand wear and tear of shop handling as well as repeated bending in positioning the work.

DURABLE – Withstand hot cleaners, acid dips, and all plating solutions. Reduces the need for recoating.

ADHERENT– Flexibility prevents cracking and seepage of solution between the coating and the rack.

CONVENIENT – Cuts cleanly and easily at the contacts. Any part can be patched without recoating the entire rack.

Address request for prices or an initial order to the nearest office listed below.

☆UNICHROME "AIR DRY" RACK COATING

A tough, easy-to-use insulation in which racks can be dipped and dried at room temperature. Withstands hot alkaline cleaners, acid dips, chromium and other plating solutions. Available in 1 and 5 gallon containers and 55 gallon drums.

☆UNICHROME COATING 202

A new coating material which, in addition to the properties of Unichrome "Air Dry" Rack Coating, is especially suitable for insulating racks used in anodizing solutions and in hot, strongly alkaline solutions. Applied by dipping at room temperature and normally force-dried to obtain the good adherence required for this severe service. Available in 1 and 5 gallon containers and 55 gallon drums.

OTHER U. C. PRODUCTS AND PROCESSES TO SERVE YOU

CHROMIUM PLATING for wear-resisting, oil-retaining and other types of finishes.

☆UNICHROME ALKALINE COPPER for smooth, lustrous copper plating in a non-cyanide bath.

☆UNICHROME ALKALINE ZINC for smooth, lustrous zinc plating in a non-cyanide bath.

☆ANOZINC for anodic treatment of zinc giving greatly increased corrosion-resistance and an attractive black or yellow finish.

☆Trade Mark Reg. U. S. Pat. Off.

☆UNICHROME ALKALINE STRIP BATH for speedy removal of copper, chromium, zinc, etc., from steel without etching the base.

☆UNICHROME STOP-OFF LACQUERS AND COMPOUNDS each specially formulated to meet specific plating problems.

☆UNICHROME CLEAR LACQUERS each specially formulated to meet specific service requirements.

☆UCILON – a corrosion-resistant coating material for protecting surfaces against acids, alkalies, water, gasoline and various corrosive chemicals.

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street
New York 17, N. Y.
Waterbury, Conn. ★ Detroit, Mich

SAVE *time and money* —

DEBURRING & BURNISHING METAL PARTS

Today's production requirements call for speed and efficiency. Rounding corners or removing burrs by old time filing or grinding methods is costly.

Do the job speedily. There are many jobs that lend themselves to barrel finishing. Write us today for complete information.

L. P. BROWN MACHINE & TOOL CO.
Attleboro, Mass.
New York Office: 185 Madison Avenue
MR. H. GREEN **Telephone MU. 6-8393**

FOR SALE Available for Immediate Shipment

1—5000/2500 AMPERE, 6/12 VOLT, **A. P. MUNNING CO.** "OPTIMUS" Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
2—5000/2500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO.** Motor Generator Sets. Excellent Condition.
1—3750/1750 AMPERE, 6/12 VOLT, **A. P. MUNNING CO.** "OPTIMUS" Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
1—2500/1250 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE CO.** "INTERPOLE" DESIGN, Motor Generator Set. Separately Excited. Full Control Equipment. Excellent Condition.
1—2500/1250 AMPERE, 6/12 VOLT, **ZUCKER, LEAVITT & LOEB** Generator Set. New Commutators. Excellent Condition Throughout.
1—2000/1000 AMPERE, 6/12 VOLT, **GENERAL ELECTRIC CO.** Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
1—1500 AMPERE, 24 VOLT, **A. P. MUNNING CO.** "OPTIMUS" Motor Generator Set. "INTERPOLE" DESIGN. Excellent Condition.
1—1500/750 AMPERE, 12/24 VOLT, **HANSON & VAN WINKLE CO.** Motor Generator Set. "INTERPOLE" DESIGN. Full Panel-Board Arrangement. Excellent Condition.
1—1500/750 AMPERE, 6/12 VOLT, **CONNECTICUT DYNAMO AND MOTOR CO.** Motor Generator Set. Excellent Condition.
1—1000/500 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE CO.** Motor Generator Set. Interpole Design. Excellent Condition.
1—1000 AMPERE, 6 VOLT, **IDEAL ELECTRIC CO.** Motor Generator Set. Excellent Condition Throughout.
1—1000 AMPERE, 8 VOLT, **JANTZ & LEIST** Motor Generator Set. Excellent Condition.
1—1000 AMPERE, 6 VOLT, **JANTZ & LEIST** Motor Generator Set. Excellent Condition.
1—500 AMPERE, 24 VOLT, **HANSON & VAN WINKLE COMPANY** Motor Generator Set. Interpole Construction. Excellent Condition.
1—**HANSON-VAN WINKLE-MUNNING CO.** Semi-Automatic Plating or Cleaning Conveyor. Unlined Steel Tank 10'x42"x40". Variable Speed Controls. Ready for Immediate Shipment.

M. E. BAKER COMPANY **143 SIDNEY STREET CAMBRIDGE, MASS.**

SURE, that envelope's bulging. But let me tell you something, brother, before you spend a dime . . . *That money's mine too!*

I can take it. The mess out here. And missing my wife and kid.

What I *can't* take is you making it tougher for me. Or my widow, if that's how it goes. And, brother, you *will* make it tougher, if you splurge one dime tonight. There isn't as much as everybody'd like to buy—and you have more green stuff than I. But remember this, brother—everything you buy helps to send prices kiting. Up. UP. AND UP. Till that fat pay envelope can't buy you a square meal.

Stop spending. For yourself. *Your* kids. And mine. That, brother, is sense. Not sacrifice.

Know what I'd do with that dough . . . if I'd the luck to have it?

I'd buy War Bonds—and, God, would *I* hang on to them! (Bonds buy guns—and give you four bucks for your three!) . . . I'd pay back that insurance loan from when Mollie had the baby . . . I'd pony up for taxes cheerfully (knowing they're the cheapest way to pay for this war) . . . I'd sock some in the savings bank, while I could . . . I'd lift a load off my mind with more life insurance.

And I wouldn't buy a shoelace till I'd looked myself square in the eye and knew I couldn't do without. (You get to knowin' —out here—what you can do without.)

I wouldn't try to profit from this war—and I wouldn't ask more for anything I had to sell.

I've got your future in my rifle hand, brother. But you've got both of ours, in the inside of that stuffed-up envelope. You and all the other guys that are lookin' at the Main Street shops tonight.

Squeeze that money, brother. It's got blood on it!

Use it up . . . wear it out, make it do . . . or do without

A UNITED STATES WAR MESSAGE PREPARED BY THE WAR ADVERTISING COUNCIL; APPROVED BY THE OFFICE OF WAR INFORMATION; AND CONTRIBUTED BY THE MAGAZINE PUBLISHERS OF AMERICA

PLEASE HELP !

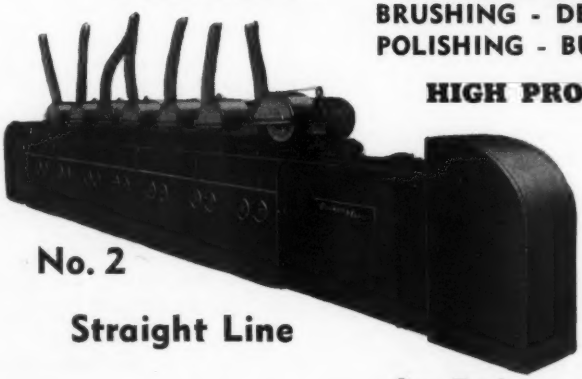
The individual copy sales for July, November and December 1943 issues of the REVIEW have been so great our reserve stock has become seriously low for these three months.

If you no longer have use for your July, November and December copies, won't you please send them to National Headquarters. We can make very good use of any copies sent in. Thank you for your response.

AMERICAN ELECTROPLATERS SOCIETY
545 FIFTH AVENUE NEW YORK 17, N. Y.

Packer-Matic
Automatic

BRUSHING - DEBURRING
POLISHING - BUFFING



No. 2
Straight Line

HIGH PRODUCTION WAR & POST-WAR PARTS

Ask for Bul. No. 15

Our Engineers At Your Service

THE PACKER MACHINE CO. MERIDEN, CONN., U.S.A.

Cut Corrosion COSTS with LEAD LININGS

Although scarcities exist with regard to many of the lining materials which plating tank buyers like to specify, we can still keep your corrosion cost losses down near the bottom, by lining your tanks with lead. By keeping your tanks in service longer, lead linings protect your production schedules as well as your dividends. And you can safely leave the fabrication details to Stortsweldmen of lead.

STORTS WELDING COMPANY

42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specification

BRANCH NEWS

Business and Social News • Educational Activities

6th Annual

New England Regional Meeting

New Haven ~ April 22nd

EDUCATIONAL SESSIONS
2 P.M.
STRATHCONA HALL - YALE UNIVERSITY

BANQUET
7 P.M.
BALLROOM - HOTEL TAFT

DAYTON BRANCH

A Regional Meeting of the Dayton, Cincinnati, Indianapolis and Anderson Branches was held in the Grand Ballroom of the Miami Hotel in Dayton, November 26, 1943.

The President of the Supreme Society and the Third Vice-President were present and spoke briefly, and Past-President Charles Conley acted as master of ceremonies.

Dr. Gustav Egloff, President of The American Institute of Chemists and Director of Research of Universal Oil Products Company, one of the world's outstanding authorities in the field of motor fuels, delivered a most interesting address on "A World at War and the Post-war Era," in the course of which he presented highly illuminating facts and figures showing the extreme superiority of the United Nations' aircraft. Following Dr. Egloff's address, the 186 members and guests present heard a discussion of the Anozinc Process by Dr. J. E. Stareck, Director of Research of United Chromium, Incorporated.

The Toulmin Trophy established by Colonel H. A. Toulmin, Jr., for annual competition for the best paper presented before any Branch in the Region, and the Dayton Award, established by E. L. Luaces, President of Chemical Developments Corporation and Librarian of the Dayton Branch for annual award to the Branch having the best attendance record at its meetings, were presented to the President of the Dayton Branch and accepted by him.

Several variety acts, refreshments and a general get-together closed the meeting in the small hours of the following morning.

A meeting of the Dayton Branch was held jointly with the Miami Valley Chapter of The American Institute of Chemists, at The Engineers Club of Dayton, December 10, 1943. The program was so interesting that several members and guests brought ladies, and in spite of strong competition from the AIEE which was having a social evening with music and movies, a goodly crowd was on hand to hear two capable speakers.

With Mr. William Neill, the Branch President presiding, the Librarian introduced Mr. William B. Stoddard, Jr., President of the Cincinnati Branch, who

spoke on "Iron Plating." Mr. Stoddard's address was well received, and brought forth a lively discussion.

The Librarian, acting then as Chairman of the Miami Valley Chapter of The American Institute of Chemists, introduced Mr. L. R. Luchford, Chief Development Engineer of The British Thermostat Company Limited, Sunbury-on-Thames, England, who has been visiting in the United States for several months on behalf of the British Air Commission. Mr. Luchford gave a long, detailed and amusing version of his experiences in and impressions of this country, and his witty manner and fine delivery kept the audience thoroughly entertained. The meeting only broke up when the time to close up the Club for the evening finally arrived.

A meeting of the Dayton Branch was held Friday evening, January 14, 1944, at The Engineers' Club of Dayton.

Dr. James R. Withrow, F.A.I.C., Professor and Chairman of the Department of Chemical Engineering at The Ohio State University, was the speaker, and his subject "Synthetic Rubber."

Dr. Withrow's remarks were well received by the 54 members and guests present. A series of lantern slides showing the various processes in use in this country and some of the more important installations for the manufacture of synthetic rubber was shown through the courtesy of Colonel Bradley Dewey, the Rubber Director. Also, through the courtesy of The Dayton Rubber Manufacturing Company, samples of the various types of synthetic rubber now known and of innumerable articles made of such substances and widely used industrially were exhibited and inspected by those present.

The large and attentive audience, one of the largest of the season, bespeaks the value of discussions in fields other than strictly electroplating. The plater has much to learn from related fields, and the friendships and business contacts engendered at such meetings often proves of everlasting value.

In absence of the Branch President, Mr. William Neill, the meeting was presided over by the Librarian, who introduced the speaker and guided the interesting discussion which followed.

W. M. DURNBAUGH, *Sec'y.*

WATERBURY BRANCH

Waterbury Branch held its regular monthly meeting at the Hotel Elton, January 14, 1944. In the absence of the Secretary, Fred Foster took notes of the proceedings as detailed herewith. As usual the technical session was preceded by dinner at 6:30 in the Colonial Room.

The meeting was opened at 8:10 by President Carl Kilborn who announced that action on membership applications would be postponed and also that the next business meeting would be January 28 at the home of Arthur W. Tracy. The meeting was then turned over to Henry Strow, Technical Chairman for the evening.

Mr. William Starr was introduced and discussed recent changes in priorities of interest to platers. These changes included (1) relief from the restrictions of Limitation Order L-110 for plating and anodizing equipment to the extent that orders for less than $500.00 do not have to be rated under PD-1A, (2) small order exemptions under M-319 for abrasive grains are increased to 20000 lbs. for each 2-month allocation period. Sodium Cyanide has been placed on allocation under M-366 and WPB must authorize use and delivery of more than 1000 lbs. per month; chromic acid continues under allocation and remains tight; trichlorethylene is expected to be placed under formal allocation, but not until after February 1.

Ellsworth Candee stated that plans for the regional meeting were in the making and Hank Kellner informed us that a tentative date of April 22 had been selected with the meeting to be held in New Haven. Ellsworth spoke briefly on plating specifications, to the effect that the days of plating for decorative purposes only, were going, and that future plated coatings may be expected to be applied for definite engineering purposes.

Two movie films were then presented, one of which gave the story of the fabrication of Magnesium metal, presented by the Dow Chemical Co., and the other showed the landing at Guadalcanal and defense of the island by the Marines. Both films were very interesting and were well received by the entire group.

The speaker of the evening was Mr. Fred Hampson of the Plating Processes Corp. of Holyoke, Mass. The subject of his talk was "Electronic Tank Control" and he illustrated it very effectively with a demonstration on a working model. By use of this control, solution levels are kept constant and leaks in tank linings, coils, etc. are detected before damage can be excessive. Electronic control is a 24-hour a day safeguard against numerous possible mishaps.

The Book Review, conducted by Dr. George Dubpernell, covered Simonds and Ellis, "Handbook of Plastics." This book is comprehensive, detailing information on kinds, properties, methods of plating, trade names, etc., of the many plastic materials.

A short question and answer period on hydrogen embrittlement of steel during zinc plating concluded the technical program. The meeting adjourned at 10:10 P.M.

S. L. HENN, *Secy.*

ROCHESTER BRANCH

The regular monthly meeting of the Rochester Branch was held on Wednesday, January 12, 1944.

President John Q. Adams opened the session at 8:30 P. M. The minutes and treasury report were read and approved.

Everyone was in favor of remembering Mr. F. Chambers with a small gift from our Branch.

The Board of Managers will meet on Thursday, January 20, 1944, with the committees for the benefit of our Educational Dinner Dance to be held on March 11, 1944.

Mr. Adams introduced Mr. Robert Sizelove of the War Service Division of the Frederick Gumm Chemical Company.

Bob gave one of the most interesting and timely talks we have had on Magnesium and Deburring in a long time. His double subject proved very valuable to everyone. Bob gave each member two charts entitled "Surface Treatment for Magnesium Alloys" and "Composition and Properties of Magnesium Alloys," which proved very valuable in following his discussion.

The Deburring topic proved very interesting and valuable. Samples were shown of how the "Celepolon Process" deburred gun parts, airplane parts, tank parts, and many others too numerous to mention, and their comparison with the other methods which are gradually disappearing. The methods discussed were abrasive mixture, ball burnishing, dry tumbling, and using such materials as quartz, oxide crystals, etc. Many questions were asked and answered on both subjects.

Mr. Sizelove was given a rising vote of thanks, after which the President adjourned the meeting (at 10:30).

DONALD C. BLUM,
Secretary-Treasurer

LANCASTER BRANCH

The Lancaster Branch met January 14 at Stevens Trade School. There were 35 members and visitors present.

The application of Dr. Briggs of the R. C. A. plant was approved.

The speaker, Mr. A. Hirsch, was introduced by Mr. George Gehling. The subject was "Chemical Analysis of Plating Bath." The speaker stated that

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the analysis of plating baths was of no value unless the cleaners and pickle were analyzed and controlled. Mr. Hirsch outlined simple and practical methods for the average plater to prepare his standard solutions and the methods used for analyzing and controlling cleaners and pickles.

Several plating baths were discussed and the method for analyzing them given. Mr. Hirsch then outlined a simple procedure by which the platers could determine the pH of any solution.

The meeting closed at 10 o'clock.

WILLIAM D. FORDNEY, *Secretary*

TORONTO BRANCH

The regular meeting of the Toronto Branch was held on January 14th at the Royal York Hotel with President Boaz in the chair, and a fair attendance.

One application was received and the application of Mr. Frank Lysaght was balloted on and elected into membership. Two members were suspended. Mr. Walter Barrows presented the branch with a beautiful scroll as Roll of Honor for the Toronto members who had joined the fighting forces with the names as follows: A. Acheson, F. J. Broughton, W. Rennie, J. Leach, J. McLeod, and A. Severs.

Mr. Boaz gave report and progress of the annual dance, to be held February 18th. Mr. Tom O'Keefe gave report of the annual Card Party to be held in March.

Under Good and Welfare, Mr. Tom Boaz and Mr. Arthur West were slated to be the speakers of the evening with the subjects, Cathodic Movement versus Air Agitation and Post-War Problems.

Mr. Boaz spoke on cathodic movement as most beneficial especially with alkali and nickel solutions and gave illustrations on the blackboard to bring out his point, also how to hang flat pieces to the anodes. Quite a discussion followed this talk, some of the members favoring air agitation. Jimmy Vaughan got in the thick of it and using the blackboard gave a drawing of a tank with air pipe line, with holes in the bottom of the pipe in such a way that it did not disturb the sludge. This talk lasted forty minutes.

Mr. West spoke on Post-War Problems and stated the greatest development in the electroplating line before the war was bright nickel sol, and was still being developed. He spoke on plastics and aluminum and cutting costs on buffing by the use of the electro polishing method and said that post-war would have new and improved methods in the electrodeposition of metals; also different plating baths. Mr. West spoke on high speed silver and improved zinc, that new alloys would be created and that aluminum would be in great use in the future. He mentioned deburring versus barrel tumbling, etc. Mr. West was on the floor answering questions for 38 minutes; both speakers received a hearty vote of thanks from the members. Thanks to you again Tom Boaz and Arthur West.

The meeting adjourned at 10:50.

JAMES S. CAIRNS

BALTIMORE-WASHINGTON BRANCH

The December meeting of the Baltimore-Washington Branch of the A. E. S. was held on December 4th at the Hopkins' Apartment dining room in Baltimore, Md. This was our first Baltimore meeting for the season, and it turned out to be the largest regular meeting we have had. Mr. K. M. Huston had charge of the arrangements, and with his customary zeal succeeded in bringing out a good attendance. Fifty-two guests and members were present at the dinner; the attendance at the meeting was 60.

Among the platers present, was a Bevy of Belles from the electroplating section of the Bureau of Standards: Alice Olin, Kathryn Christoph, Mary Imrey and Mardelle Brown. The girls enjoyed the meeting and would like to know the name of the plater who sat in front of them and wiggled his ears to amuse them.

Sam Warnock lost a bet to Kenneth Huston, that 25 Washington members would be present. He might have won though, if Tom Slattery hadn't been out of the room when heads were counted.

The business meeting was short. Mr. Robert Thomas Everett was elected into membership and Mr. Amos Judd was reinstated. Final arrangements were

American Electroplaters' Society

22'ND Banquet and Educational Session

Rochester, New York Branch

~ March 11, 1944 ~

TICKETS $3.30 TAX INCLUDED

Educational Program
2 P. M. to 5 P. M.

Dr. Chester
of Poor and Company
TOPIC:
"The Promat Process"

Mr. Schweikher
TOPIC:
"Sulfanate in Lead Plating Baths"

Mr. George Dubpernell
of United Chromium Inc.
TOPIC:
"Industrial Chrome Plating"

BANQUET AND ENTERTAINMENT
7 P. M. to ?

made for the banquet, a notice of which is contained elsewhere in this Review.

On the program Librarian Lamb introduced the Speaker, Myron C. Diggin, of the Hanson-Van Winkle-Munning Co., who spoke on "Lead Plating."

His talk was authoritative and complete. The fluoborate fluosilicate and sulfamate baths were discussed, as well as the equipment required and the uses of lead deposits. Mr. Diggin also touched on some recent development in plating. He predicted that after the war the semi-bright, ductile nickel would probably displace bright nickel. He also demonstrated a circular slide rule which was used to quickly calculate additions to baths and the time required to produce deposits of a given thickness.

ABNER BRENNER, *Secretary*

NEW HAVEN BRANCH

New Haven Branch held its joint business and educational meeting on October 5, 1943 in the Sterling Chemistry Laboratory of Yale University.

President Walter T. Lynch presided and the following committee appointments were made:

Sick Committee—George G. Knetch, Albert O'Jackle, John W. English.

Educational Committee — Dr. Henry L. Kellner, Joseph T. Sullivan.

Membership Committee — Kasmir J. Jaros, Athelm Peck, John M. Barry.

Two candidates were elected to Active membership: Mr. John H. Gormley of the Manufacturing Supply Co., Shelton, Conn. and Mr. Howard E. Christie of the Christie Plating Co., Groton, Conn.

A motion was made by Jack Barry and seconded by Bill Bridgett to send Jack English, who has been very sick, a remembrance of fruit or flowers from his associates. George Knetch and Al Jackle were appointed to take care of this.

The motion was made by William J. Cullen and seconded by Jos. M. Cooke to call a meeting of the Board of Governors to approve the dismissal of all members who are delinquent in their dues.

President Lynch turned the meeting over to our Educational chairman, Dr.

H. L. Kellner who introduced Mr. Henry Mahlstedt of the United Chromium Corporation. Mr. Mahlstedt spoke of the Technique in Hard Chrome, Porous Chrome and Decorative Chrome. This proved to be a most interesting and informative lecture. He materialized his talk by showing plating racks with pieces plated in them and invited members to interrupt his lecture to question various phases during his discourse. Mr. Myron B. Diggin of the Hanson-Van Winkle Co. took a leading part in this discussion. The meeting ended at 11 o'clock with the members helping Mr. Mahlstedt pack his samples and racks after giving him a rising vote of thanks for his excellent talk.

B. J. GAFFNEY, *Secretary*

New Haven Branch held its regular monthly meeting on November 2nd in Sterling Chemistry Laboratory of Yale University. The meeting was called to order by president Walter Lynch, who dispensed with any business session because of the absence of Bernard Gaffney, the secretary-treasurer. The president notified the members of the death, earlier in the evening, of the secretary's mother and all the members expressed their regrets and the chairman of the sick committee instructed to send a spray of flowers. Also at this time the death of one of the old New Haven members, Mr. James F. Hines, was announced and many members planned to attend the rites which were to be held the following day.

At this meeting three of the leading lights of the plating industry in the East were present, namely, Mr. George Hogaboom, Dr. Walter Meyer, and Mr. Myron Diggin. Also, our second vice-president Mr. "Chick" Helmle was present but both he and Mr. Hogaboom declined, when called upon, to speak. One of our old New Haven friends Mr. Doucette was also present along with numerous representatives of the Frederick Gumm Chemical Co. After reading a few announcements regarding the proceedings of the Educational Sessions of the national convention, the president turned the meeting over to the educational chairman for the evening.

"Doc" Kellner introduced the speaker for the session who was Dr. A. C. Ches-

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ter, chief chemist of the Promat Division of Poor & Co., Chicago, Illinois. The title of his talk was "Superimposition" which means the superimposing of alternating current over direct current in an electro-plating set up. Dr. Chester is one of the leading authorities on this subject in the country and his work with plating solutions is the result of fifteen years of experience with these intricate electrical installations.

The speaker began by saying that the work on electrodeposition is the result of numerous years of using alternating current superimposed on direct current in the field of electrowinning. The method used is to apply an alternating current potential to a circuit in which direct current is already flowing. The resulting current to be found in this circuit is not the sum of each current applied, but it is found to be the root mean square of the values of current supplied per cycle. The effect of this application of alternating current is to displace the zero value of the sine wave resulting from the alternating current up above the regular alternating current zero and resulting in much lower periods of negative voltage.

In the circuit the process uses assymetrical alternating current in which the sine wave, although displaced is reversed alternately. There were three ways, described by Dr. Chester, to attain this desired assymmetrical current. The first could use a transformer and generator in series but this was found to give wave distortion and bad core characteristics. The second method was to use a system which incorporated a reactor in the above series circuit, but this did not prove to be much better than the first system. The third method described for superimposing was to incorporate a generator, reactor, transformer, and condenser in a circuit and then apply the load in parallel across the circuit. This was found to be the most satisfactory arrangement and is used in the present Promat Process for electroplating.

The Promat Process, besides using superimposed current has additional organic materials added to the electrolyte in the form of aldonic acids. These aldose sugars when used in the plating solution are reformed by the use of superimposed current which electroxidizes the acids. According to Dr. Chester there are 600,000 gallons of these type solutions in use in the country, mostly in the form of zinc solution. Higher current densities are attainable and better workability of the solution is claimed for the process.

After the talk Dr. Chester answered numerous questions put to him by some of the audience. Many of the members present felt as though the process although possessing numerous possibilities still had numerous question marks to be answered. No rash and revolutionary promises were made by the speaker but he showed numerous samples of successfully plated articles in both zinc and cadmium. After the question period and the inspection of the samples the educational chairman turned the meeting back to Mr. Lynch who called for a rising vote of thanks from the audience. The meeting was then adjourned at approximately 10:30 o'clock.

B. J. GAFFNEY, *Secretary*

BOSTON BRANCH

Boston branch met Thursday, Jan. 6th, at the Statler Hotel, Boston, with Pres. George Swift in the chair.

Minutes of the previous meeting read and approved. Communications read placed on file. Bills read and ordered paid.

Our meetings are attended by such large crowds that we must look for larger quarters, so a committee was appointed to look for better quarters. Robert Smith will report at the next meeting or sooner if he can find quarters for our next meeting.

Boston branch will hold their annual banquet this year and Robert Smith will be chairman and will pick his own committee—the date will be set later.

The following applications were read and approved by the Board of Managers and elected to membership: John J. Davis, 66a Grampian Way, Dorchester, Mass., Active; Edward M. Whelan, 14 Chestnut Street, Danvers, Mass., Active; Roy A. Anderson, 383 Harvard Street, Cambridge, Mass., associate; Jerry Capozzoli, 30 Clapp Street, Stougton, Mass., Active; Salvatore Aversa, 189 Clare Ave., Hyde Park,

Mass., Active; Robert E. Callahan, Olean Road, Burlington, Mass., Active.

The following applications were read for the first time and turned over to the Board of Managers for approval; James F. Campbell, 160 Portland Street, Boston, Mass., Active; Michael A. Bronzo, 10 Marshall Street, Worcester, Mass., Active; Augustus L. Bashe, 21 Park Lane, Newton Center, Mass., Active; Theodore F. Robak, 82 Sudbury Street, Boston, Mass., Active; Samuel Abend, 82 Sudbury Street, Boston, Mass., Active; Louis Abend, 82 Sudbury Street, Boston, Mass., Active; Peter P. Rzezuski, 82 Sudbury Street, Boston, Mass., Active; Albert I. Wile, 21 Blake Street, Westboro, Mass., Associate; Myer Shapiro, 240 Humboldt Ave., Roxbury, Mass., Associate.

After the regular business was out of the way Bob Magnuson introduced the speaker of the evening, Mr. Allen T. Baldwin, of the Hanson-Van Winkle-Munning Co., Matawan, N. J.

His topic was: "Hot Galvanizing & Hot Tinning." We were surprised to know how many of those present are doing this line of work and we also watched a movie: "The World at War." This should be seen by every member in the society. A report will be made on Mr. Baldwin's talk later. He answered all questions for the members and was given a rising vote of thanks for his fine talk.

The meeting adjourned at 11 P. M.

A. W. GARRETT, *Secretary*

TOLEDO BRANCH

A regular meeting of the Toledo Branch of the A. E. S. was held at the Hilcrest Hotel, Thursday evening, Dec. 2nd, 1943, with twenty members present.

The meeting was called to order at 8:30 o'clock by the President, Mr. Dressel.

Minutes of the previous meeting were approved as read.

At this time one-half hour was set aside for a Bull session with Post-War Business in the plating Field being the main topic discussed.

Upon motion by Mr. Miner and seconded by Mr. Vannorsdall the meeting adjourned at 9:15 o'clock.

Following the business meeting everyone retired to the next room where a very pleasant buffet lunch was awaiting them. The remainder of the evening was spent playing cards and informal discussions on pet plating problems.

Dr. Hull who was to have been the speaker was unable to be present due to other pressing business.

G. BERGMAN, *Secretary*

GRAND RAPIDS BRANCH

The following are the minutes of the Grand Rapids Branch meeting held December 10th, 1943.

This meeting again was attended by a large number of friends and members. It was promptly opened at eight o'clock with the showing of a movie entitled "The Ramparts We Build," and another film showing late battle scenes of recent fighting in Italy.

Directly after the showing of the film a short business session was conducted by our President, Homer Morton. Reports of Committees were given and communications read.

Two new members were elected:

Jacob H. Markham, as an Active Member, 956 Orchard Ave., S.E., Grand Rapids, Michigan.

Charles Dunning Wilson, as an Associate Member, 35 Lafayette Ave., N.E., Grand Rapids, Michigan.

Three applications were presented for consideration of the Board and to be voted upon during the February meeting.

Mr. L. C. Kroes, as Associate, 1010 Oak St., Kalamazoo 43, Michigan.

Mr. Phillip A. Joyce, as Active, 907 Lake Michigan Drive, Grand Rapids 4, Michigan.

Mr. John Wozniski, as Associate, 2049 Michigan Avenue, Willow Lodge, Building A, Room 134, Ypsilanti, Michigan.

Dr. J. E. Stareck, Director of Research for United Chromium Corporation, was then introduced as the speaker for the evening, who described Anozinc, a process used to increase the value of zinc coating and to eliminate white corrosion stains. Dr. Stareck also talked on non-cyanide zinc and bright copper solutions that are process solutions of the United Chromium Corporation. Directly following, the meeting was open for technical questions pertaining to his zinc coatings.

The meeting was then adjourned and the Rowe Hotel served the popular-priced refreshments.

G. E. ABEL, *Sec'y-Treas.*

PROVIDENCE-ATTLEBORO BRANCH

The regular meeting of the Branch was held on Monday evening, December 20th, in the Crown Hotel, Providence, R. I.

After a dinner at six-thirty, at which Mr. Frank J. Clark very graciously acted as host and at which several members and guests of the Branch were in attendance, Mr. J. T. Henry, Jr., presented the speaker of the evening, Mr. Myron B. Diggin, Chief Chemist, Hanson-Van Winkle-Munning Company.

The splendid talk on "Zinc Plating," so capably given by Mr. Diggin, proved to be most informative, and, as many of those present are now engaged in zinc plating, was obviously greatly appreciated. The speaker devoted a few minutes only to the history of zinc plating, and then went right into the chemistry and mechanics of his subject. Many samples of high grade work were exhibited—some having deep recesses and many requiring special attention as to methods of racking.

Mr. Diggin has a most pleasing style in giving a talk—very often getting right down into the audience to show a particular sample or to more closely explain a point. After a long question period the speaker was extended a vote of thanks for an evening which will be long remembered.

Fourteen applications have been received recently and we look forward to a very nice 1944.

Arrangements have been made to hold all future sessions in the Providence Biltmore Hotel.

CHAS. C. CHACE, *Secretary*

LOS ANGELES BRANCH

The regular monthly meeting of the Los Angeles Branch was held Dec. 13th at the Rosslyn Hotel.

A very nice dinner was enjoyed by the 52 members and friends present.

President E. R. Holman called the meeting to order.

Stanley Rynkof, Sgt. at Arms, introduced the following visitors:

Ted Weisser of Thompson Products, Inc.

Jack Hodge, Latex Seamless Products Co.

Roy Lostutter, Hard Chrome Engineers.

Howard Woodward, Hard Chrome Engineers.

Clifford Graham, Hard Chrome Engineers.

Guy Paarson, Cad. Nickel.

Bob Lawson, Airesearch Mfg. Co.

Roy Weaver, General Electric of Ontario, Calif.

S. F. Peachin, General Electric of Ontario, Calif.

J. C. Williams, Bendix Aviation.

J. M. Clark, Bendix Aviation.

H. S. Young, Douglas Aircraft Mfg. Co.

E. P. Troeger, Douglas Aircraft Mfg. Co.

Kenneth Mumford, National Supply Co.

The meeting was turned over to Mr. Earl Coffin, Librarian, who introduced the speakers of the evening: Mr. Carl Stentz of Latex Seamless Mfg. Co. and Mr. Wallace, Metallurgist with Columbia Steel. Both talks were very interesting and brought up several discussions.

The meeting was turned back to President Holman, who after inviting visitors to become members, and wishing every one a Merry Christmas and Happy New Year, called a five minute recess. Visitors were dismissed and business meeting opened.

Mr. Howard was initiated as an Associate member. Minutes and financial reports were read and approved.

Mr. Marcus Rynkoff reported that he had chosen his committee for the annual dinner dance. They are: C. E. Thornton, E. W. Wells, Frank Bunker, Stanley Rynkof, Don Bedwell, E. Lamoureux, E. R. Holman, John Merigold, Earl Coffin and C. C. McLaren.

The dance will be held at the Los Angeles Breakfast Club, March 18th, 1944.

Mr. Coffin reported that prospects for speakers for the Educational Session were the best in years.

It was also reported that James

ApRoberts, former librarian for the Branch, had enlisted in the Navy.

Meeting adjourned 10:30.

C. C. MCLAREN, *Secretary*

CLEVELAND BRANCH

Minutes of the meeting of the Cleveland Branch of the American Electroplaters' Society held in the Cleveland Hotel on Saturday evening, December 8, 1944.

The meeting was called to order at 8:30 P.M. by our President, Mr. William E. O'Berg.

The minutes of the previous meeting were approved as read.

The applications of: Mr. Melvin C. Balke of Cleveland, Ohio, as Associate; Mr. Earl C. Chrisman of Painesville, Ohio, as Associate; Mr. Stephen Palisin of Lakewood, Ohio, as Active; were read and referred to the Board of Managers.

Mr. William D. Scott spoke of the progress being made on the preparations for the 1944 Convention.

On the Annual Dinner Dance being held on Saturday, February 19th, Mr. Stephen Miller stated that approximately all arrangements had been completed and that the tickets would be out in a few days. It was decided that the price of these should be $4.00 per person. It was also deemed desirable to invite the officers of the Supreme Society to attend this affair, and the secretary was instructed to do so.

A letter dated December 18 from the Chicago Branch was read inviting the members to their Annual Educational Session and Dinner Dance to be held at the Palmer House in Chicago on January 22nd. It is hoped that as many as possible will attend.

President O'Berg spoke of the talk to be given to us by Dr. E. T. Ewing of the Michigan State College on Friday evening, January 28th in the Cleveland Hotel.

Mr. Renton assisted by Mr. F. M. Carlson then showed a movie of the Buffalo Convention; this through the courtesy of the Lea Mfg. Co., of Waterbury, Conn.

There being no further business, the meeting adjourned at 10:30 P. M.

GEORGE B. SVENSON, *Sec'y. & Treas.*

Minutes of the meeting of the Cleveland Branch of the American Electroplaters' Society held in the Cleveland Hotel on Friday evening, December 10, 1943.

The meeting was called to order at 8:30 P. M. by our President, Mr. William E. O'Berg.

The minutes of the previous meeting were approved as read.

Under election of candidates, the following whose applications were read at the October 6 meeting and whose names appeared in the November issue of the REVIEW were elected to membership: Mr. Ralph G. Kennedy, Jr., of Cleveland, Ohio, as Associate; Mr. Thomas R. Gill of Cleveland, Ohio, as Associate.

President O'Berg then re-introduced Mr. Thomas Gill, the speaker of the evening. Mr. Gill gave us a rather detailed and interesting talk on the work that had been accomplished on bright nickel plating using insoluble chemical lead anodes. This was done when nickel anodes first became difficult to obtain and prior to nickel salts being placed on allocation. He spoke of the consistent results obtained and also of the ease in maintaining this type of bath. A rising vote of thanks was given the speaker for his very fine talk.

The chair announced that the next meeting would be held on Saturday evening, January 8. There being no further business the meeting adjourned at 10:00 P. M.

GEORGE B. SVENSON, *Sec'y. & Treas.*

Minutes of the meeting of the Cleveland Branch of the American Electroplaters' Society held in the Cleveland Hotel on Saturday evening, November 6, 1943.

The meeting was called to order at 8:30 P. M. by our President, Mr. William E. O'Berg.

The minutes of the previous meeting were approved as read.

Mr. Steve Miller reported on the progress being made on the arrangements for the Annual Banquet and Dance to be held on Saturday night, February 19, 1944, advising that the admission donation would be announced at a later date. Quite a few present expressed a timely preference of chicken as the "piece de resistance," rather than beef.

Mr. William D. Scott spoke on what was being done in a preliminary way for the 1944 Convention and also of his contemplated meeting with the Executive Board of the Supreme Society in Detroit on December 4. A vote of confidence was extended to Mr. Scott as Chairman of the 1944 Convention Committee.

An interesting letter from Mr. Walter L. Pinner, 3rd Vice President of the Supreme Society was read. This was in reference to the exhibits for the 1944 Convention.

Mr. Charles Ott, ably assisted by Mr. P. Ross Lyons then gave us an instructive movie on pictures of the present war and certain phases of life in some of the countries abroad.

After a vote of thanks to Messrs. Ott and Lyons, the meeting adjourned at 10:45 P. M.

GEORGE B. SVENSON, *Sec'y. & Treas.*

LOS ANGELES BRANCH

The regular monthly meeting of the Los Angeles Branch was held Jan. 10th at the Rosslyn Hotel with an attendance of 46 members and friends.

After a very nice chicken dinner, President E. R. Holman opened the meeting.

Stanley Rynkof, Sgt. at Arms, introduced the following visitors:

Evertt Thornton of Magnetic Process Co.

Calvin B. Morris, L. B. Plating Co.

Roy Weaver, General Electric, Ontario, Calif.

Roy Lustutter, Hard Chrome Engineering Co.

H. J. DeLaney, Hard Chrome Engineering Co.

Cliff Groham, Hard Chrome Engineering Co.

N. L. Alexander, DuPont Co., Niagara Falls, N. Y.

F. J. Magee, Standard Heattreating Co.

Ken Sunterland, Turco Products Co., Chicago, Ill.

Bob Shathearn, North American Aircraft, Inglewood.

The meeting was turned over to Earl Coffin, librarian, who introduced Mr. H. H. Littleford, engineer of Standard Heating Co. He gave us a talk on heat treatment of steel prior to finishing. Mr. Harold Sheppard of the Norris Stamping Co., one of our old members, gave us a talk on zinc plating on deep draw work. He had samples and a special rack to illustrate his talk with. Both talks were very interesting and brought up some excellent discussions. Yours truly wished at the time that he was a shorthand expert so that he might take down same.

The meeting was turned back to President Holman, who invited visitors to become members.

A farewell talk by the President was given to Bruno Schindler, oldest, best liked member of our branch. He will be leaving us in the near future to take up his duties with the Weiser Mfg. Co., in Boston, Mass. Although since the war started Bruno has not been with us very much owing to working conditions we have all missed him. Prior to the war he was one of our most active members, always ready and willing to do his part. We all wish him luck and smooth sailing till we meet again.

A five minute recess was called and visitors dismissed. President reopened the meeting. Minutes and financial reports were read and approved. Bills ordered paid.

Letter was read from James ApRoberts who is in the navy.

Marcus Rynkof, chairman of the committee for the Annual Dinner Dance, reported that it had been planned to have an all day educational session starting at 10 A. M. to 4 P. M. Dinner at 7:30 P. M. We were fortunate owing to increased prices to hold the price to $3.50 per plate. First reservations will receive the best tables. Earl Coffin, librarian, said that subjects and speakers had not been decided upon as yet but will be announced in the future.

The following applications for membership were received. Evertt Thornton, Calvin B. Morris, Roy Lostutter, H. J. DeLaney and Dexter G. Hollden.

Meeting adjourned at 11:15 P. M.

C. C. MCLAREN, *Secretary*

CHICAGO BRANCH

The regular monthly meeting of Chicago branch was held Friday, Jan. 14, 1944, at the Atlantic Hotel.

President R. J. Hazucha presiding and all other Officers present.

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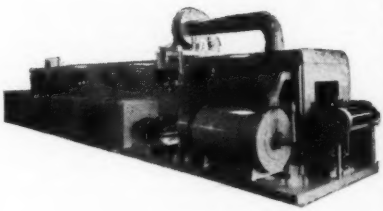

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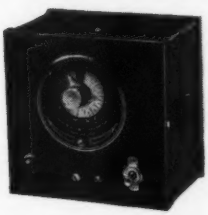

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A motion was made and seconded that we hold a joint meeting with the Electrochemical society on Friday, Feb. 11, 1944; therefore our regular monthly meeting at the Atlantic Hotel *will not be held.* MEMBERS PLEASE TAKE NOTICE. A letter on the joint meeting with the Electrochemical society will be sent out soon and all members are urged to attend, if you can't attend the dinner, come at 8 P. M. for the educational session.

Mr. Krentel, our librarian, introduced the guest speaker of the evening, Dr. J. E. Stareck, a member of the technical staff of the United Chromium Incorp., who made a very interesting and instructive talk on Anozinc. A lot of interest was shown in this process and Dr. Stareck answered many questions asked by those present. Mr. R. Chritchfield of Detroit and also a member of the technical staff of the United Chromium Incorp., was a guest at this meeting and greeted many of his friends, who were very glad to see Roy again.

The following questions were found in the question box:

#1. What causes rough copper deposits in a solution after filtering, copper 2.4 oz. per gal. Free cy. 2.1 Soda ash 10 oz. per gal. Temp. 140% P.H. 11.6 20 amps per sq. ft. 4.5 Volts.

Answer. Reduce carbonate to 4 to 6 oz., raise P.H. to 12½ and reduce cyanide to .75 to 1.0.

#2. What part, if any, does quick lime play in a Zinc solution?

Answer. Some use it to help reduce the carbonates and impurities, but it should be filtered out.

#3. Is Zinc plating here to stay, or is it just a substitute, also is 12 Volt current plating twice as fast as 6 Volt current in plating Zinc at the same amperes?

Answer. Zinc is not a substitute and it was thought it is here to stay. Some use 12 Volts on barrel plating but 6 Volts are used in tank plating very successfully.

There were 80 in attendance at this meeting which adjourned at 10 P. M. Members who do not attend these monthly meetings are not getting the full benefit of their membership, therefore all members are urged to attend meetings regularly.

J. W. HANLON, *Secretary*

PITTSBURGH BRANCH

The December meeting of the Pittsburgh Branch was held Thursday, December 9th, at the Fort Pitt Hotel at 7:00 P. M. Mr. H. F. Saylor, our President, presided and appointed Mr. Leo J. Schmitt as Secretary pro tem in the absence of Mr. Frank Keller. Only 13 were in attendance for the dinner, but a few additional members came for the meeting proper.

Mr. Dudley of United Chromium spoke immediately following the dinner on Anozinc and Pyro-Phosphate Zinc. He submitted samples of both finishes. The throwing power of pyro-phosphate zinc was the chief interest. Dr. Lancy added a great deal to the discussion with his practical knowledge of the subject.

The discussion was followed by a moving picture of the Making of Stainless Steel. The picture was highly educational and very well received.

Reading of the minutes of the last meeting was dispensed with. The board of Managers acted favorably on the application of Mr. Percy A. Goldsmith and during the Regular Meeting he was unanimously elected to membership.

The January meeting of the Pittsburgh Branch was held Thursday, January 13th, at the Fort Pitt Hotel. With dinner at 7:00 the regular meeting started at 8:15 P. M. Mr. H. F. Saylor, our president, presided over the meeting. The minutes of the December meeting were read and approved.

Mr. L. C. Conradi asked if the meeting might be changed in the future to some other date than the second Thursday since that was the night for the American Society of Metals meetings to which a number of members would like to attend. After discussion, Mr. Schmitt moved and Mr. Hennessy seconded we move the meeting up to the first Thursday of each month which was the date used until last Fall. If necessary, to accommodate the speaker, the February meeting is to be held the second Thursday.

Mr. Saylor urged the Branch to have as large an attendance for dinner as

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possible. Mr. Hennessy suggested the membership committee try to increase the membership still further. The Grand Rapids Annual Educational Session was announced for January 15th. This concluded the business meeting and the program was turned over to Mr. Wm. Hennessy.

The program consisted of short talks by a group of men from the Pittsburgh Branch and a question period. Mr. Hopper who was to talk on copper, Mr. Dimon on tin, and Mr. Drozd on Flowmetal, were unable to attend the meeting.

Mr. Jersey of Air Tool Parts Co. reviewed the book "Superfinish" published by Chrysler Corporation. Superfinish is produced by a low speed wheel of 300-1000 grit under light pressure with a lubricant. A lengthy discussion followed this book review indicating a deep interest in the subject.

Mr. John Collins of Spang Chalfant Company gave a brief review of hot dip galvanizing. He described how bran alone is added to the flux now as a binder to retain the froth while bran and glycerine were used before the war. Zinc ammonium chloride is used in place of sal ammoniac because the ammonium chloride reacts with zinc to produce zinc ammonium chloride and thereby loses a part of the ammonium. Aluminum is added in small percentages to suppress the formation of iron zinc alloys.

Mr. Wm. Hennessy of Pennsylvania Salt Co. gave a talk on "Shop Problems in Cleaning." He told of situations where unusual circumstances required special consideration.

Mr. S. S. Johnson of Weirton Steel Co. gave a brief history of the electrotin plating industry. He told why the steel companies have been forced willingly into the electrotin field by government regulations on the use of tin. About 30 to 40% of the tin is used on the same area in electroplated tin as in hot dip tin. Both alkaline and acid tin baths are being used commercially with great success. Speeds up to 1000 feet per minute are being plated at the present time with reasonable hope to eventually get to 2000—2500 feet per minute. The average thickness of electroplated tin is .00003".

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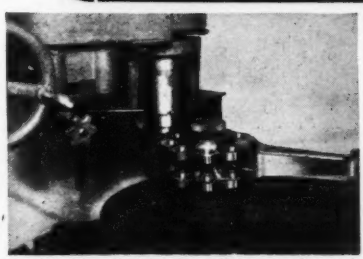

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Dr. Woltz of Westinghouse Electric and Manufacturing Co. talked on plating thickness and specifications. His talk dealt with barrel plating zinc and cadmium. The amount of plate on the various pieces from a barrel load varies according to the probability curve. To have 98% of the pieces meet a specification on thickness the average plate thickness must be approximately 175% of the specification. Dr. Woltz carried his very interesting study out on a mathematical basis and compared the work from different size and shape barrels. He found they followed the same probability curve.

Since the time was getting short the question period was cut short. The following men were picked for the Board of Experts:

Dr. Lancy of National Tube Co.
Mr. Jennison of Weirton Steel Co.
Mr. Schmitt of Cowan Manufacturing Co.
Mr. Dean of Carnegie Illinois Steel Co.
Mr. Goldsmith of Townsend Co.

Question. What are the advantages of superimposing alternating current over direct current?

Answer. It reduces polerization.

Question. What causes soft chrome in "hard chrome"?

Answer. Variation in hardness varies with current density. The chrome is hardest as it approaches the burnt chrome range, or at the highest current density. The soft chrome is probably caused by low current density. The variation is from 600 to 1000 on the Vicers scale.

Question. What is a good method of pickling heat treated chrome alloy steel without etching?

Answer. The Bullard Dunn process or pickling with sulphuricnitric acid and an inhibitor.

The meeting was adjourned at 11:15 P. M.

FRANK R. KELLER, *Secretary*

DETROIT BRANCH

Detroit Branch held the first meeting of the year at the Statler Hotel on Friday, January 7th. President J. E. Fritts, who did not miss a meeting last fall, presided. There was a good attendance

of 127 members and friends who appeared to enjoy the movie picture entitled "Winning Your Wings."

The report of the committee for the December party showed a balance in favor of the treasury after taxes had been paid. The acceptance of seventeen new members and the reading of several applications for membership indicated the success of the membership drive which was headed by Mr. Wright W. Wilson. The following were elected to membership:

Fred E. Olmstead, Vernon J. Linsdeau, Charles M. Heinen, Martin J. Gardynik, John Hassler, George Perkins, Leo J. Stacherski, Charles E. Rattray, Clifton C. Rhead, Wellington R. O'Neill, Wesley Edwards, John C. Gregory, Melvin A. Fellows, Ray Hanson, James McCann, Willis J. Stoddard, Jr., Lewis E. Honigman.

Dr. R. B. Saltonstall of The Udylite Corporation addressed the meeting on the subject of zinc plating and dichromate treatment of steel cartridge cases. The sequence of operations was listed which has been proved satisfactory and each operation was discussed individually in the order in which it was listed. The questions and discussion which followed showed considerable interest in the general subject of zinc plating and subsequent treatment of the zinc plated surfaces to prevent the formation of white corrosion products of the zinc.

F. L. CLIFTON

MILWAUKEE BRANCH

The Milwaukee Branch held its regular monthly meeting January 7th, 1944 in the Colonial Room of the Republican Hotel. The large number of members present presaged a new year of real activity. Business was previewed as usual before the start of the regular meeting which was called to order promptly at 8 o'clock.

The Banquet Committee for the Milwaukee educational session and banquet to be held on April 29th had little to report.

Mr. Dan Wittig, a supreme society honorary member, has retired from business. Although he has retired from business, he will continue our society activities. The Milwaukee Branch owes

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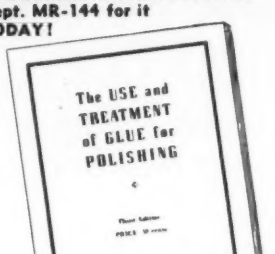

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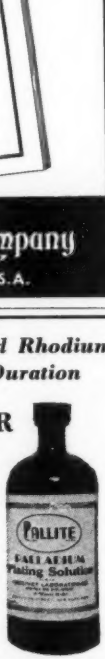

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much to Mr. Wittig who kept the society functioning through some lean years. We were all pleased to see Mr. Jack Geissman, who has been seriously ill, present at our meeting for the first time in months.

The speaker of the evening, Mr. Heuenfauth of the Crown Rheostat Company, talked about semi automatic plating machines and movable units. These units could be used where needed, their advantage being flexibility. Mr. Heuenfauth answered many questions about the adaptation of units for specific jobs.

The meeting adjourned at an early hour with most of the members remaining for the usual informal discussion.

JAMES DURNFORD, *Sec'y*

PROVIDENCE-ATTLEBORO BRANCH

Q. At 25 amps. per sq. ft., how long will it take to deposit 0.0005 inch of zinc?
A. About 19 minutes.
Q. How does the time of deposition of zinc compare with that of cadmium?
A. Cadmium at 15 amps/sq. ft. will deposit 0.001" in 40 min. Zinc at 30 amps/sq. ft. will deposit 0.001" in 33 min.
Q. In plating zinc with 12 volts will the solution heat up?
A. Yes. Cooling coils will be needed to keep the temperature down to room temperature.
Q. How much voltage is needed in still plating zinc?
A. For 30 amps., 3 volts are sufficient; for 45 amps., use 4 volts.
Q. What is the purpose of zinc dust in the purification of zinc solutions?
A. The heavy metals are displaced on the surface of the zinc, and are thereby removed from the solution. The sludge should be filtered off to prevent contamination of the solution.
Q. How long does the precipitation of the heavy metals require?
A. About 15 minutes.
Q. How may copper in a zinc solution be determined?
A. Analytically. Take down to SO_3 fumes. Plate out on platinum electrodes.

Q. How much zinc plate is necessary to protect steel for 200 hours in salt spray?

A. The Bureau of Standards gives the following figures:

0.0002"	80 hours
0.0005"	140 hours
0.001"	220 hours

Q. Is a bright deposit of a copper-zinc-tin alloy necessarily thin?

A. No. The deposit can be up to 0.002". The total metal content of the solution is less than 1 oz/gal.

Q. How may only the outside curved surface of a cylinder be chrome plated without having a build-up of plate on the edges?

A. 1. Use conforming anodes shorter than the cylinder.
2. Use a thief.
3. Set against an insulated baffle plate.

Q. Does the hardness of chrome plate tend to rise as the current density rises, even after burning?

A. Yes.

Q. How mya the hardness of a rough chrome plate be measured?

A. By a scratch test or by wear testing. Chrome hardness is usually beyond the scale of the ordinary Brinnell hardness machine.

Q. What is a proper etch for moly steels?

A. A long etch, 20-45 minutes, in chromic acid.

Q. Can chromium be barrel plated?

A. Yes, but the plating is slow and the deposit usually thin.

Q. What are the best etching solutions for high-speed steels?

A. For the tungsten and molydenum high speed steels, sulfuric acid is preferable. Warm, concentrated muriatic acid is also good for tungsten steels.

Q. Is it possible to lead plate an anode for chrome plating?

A. Yes. Use a steel core preferably. Peen lead after deposition to close pores.

Q. Is the sulfate ratio critical?

A. Yes, even on heavy deposits. High sulfate narrows the bright range and decreases coverage.

ALFRED J. MARSHALL, *Librarian*

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THE ABSTRACT SECTION

MAURICE R. CALDWELL

Chairman Program and Educational Committee

Zinc-Plating from Zincate Solutions. By G. N. LUKANINA. *Avtostroitel* **1940,** No. 7-8, 16-20; *Khim. Referat. Zhur.* **4,** No. 3, 81 (1941); *Chem. Abstracts* **37,** 4307 (1943). For zinc-plating automobile parts, the zincate bath has throwing power similar to that of the cyanide bath. It contains 0.7-1.3 oz./gal. Zn, 8-10 NaOH, and .03-.06 Sn. The tin is added as $SnCl_4$ or Na_2SnO_3, and gives silver-white deposits .0019-.0023″ thick. The bath is operated at 120-170°F., and the c.d. is 5-20 amp./sq. ft. The cathode efficiency is about 100% and does not change with the c.d., or with the temperature from 110-200°F. Carbonates above 5 oz. gal. reduce the throwing power; they are removed with $BaCl_2$. The deposits are very resistant to corrosion; plates .00016-.00023″ thick lasted 180 hours in a salt chamber. The steel requires more careful cleaning than for cyanide baths. A plating barrel of 2 cu. ft. capacity, and holding 16-30 sq. ft. of surface, with the bath at 95-105°F., requires 70-100 amps. The anode c.d. should be 2-5 amp./sq. ft.; if too high, the anodes become passive, oxygen is liberated, and black, porous, loose deposits are obtained. The zinc content must be maintained by adding ZnO.

ERNEST H. LYONS, JR.

Hard Chromium-Plating on High-Speed Tool Steels. By H. BALSTER and W. LEMCKE. *Tech. Zentr. prakt. Mettalarbearbeit.* **52,** 23-7 (1942); *Chem. Zentr.* **1942, II,** 337; *Chem. Abstracts* **37,** 4306 (1943). Worn-out drills and other tools were reconditioned by plating with .0008-.0012″ of chromium. The surface must be ground and polished, and the plating flawless. Chromium plating of new tools will decrease wear.

ERNEST H. LYONS, JR.

Smoothness of Hard Chromium Plating is Influenced by Surface Structure of the Basis Metal. By K. GEBAUER and K. SOMMER. *Tech. Zentr. prakt. Metallarbearbeit.* **52,** 17-18, 40-2 (1942); *Chem. Zentr.* **1942, II,** 336-7; *Chem. Abstracts* **37,** 4306 (1943). Chromium plated surfaces are less rough than polished or machined surfaces. Trees and burrs are formed mainly on sharp, rough surfaces, and can be eliminated by brushing with emery paste and fat on a fiber brush, and polishing, and by etching. Burrs can be avoided by first brushing and polishing the steel, using wheels with the right grain size and hardness; or better, by acid etching to equipotentialize the steel.

ERNEST H. LYONS, JR.

New Electroplating Processes: Chromium-Plating from Baths Without Sulfate Ions. A. POLLACK. *Oberflachentech.* **19,** 21 (1942); *Chem. Zentr.* **1942, II,** 336.—CrO_3 plating baths with HF and H_2SiF_6 addns. and their properties are discussed.

M. HARTENHEIM, *Chemical Abstracts*

Pinholing and Cissing of Coatings. M. HESS. *Oil Colour Trades J.* **103,** 664-6, 668 (1943).—Pinholing is defined as the formation of circular tiny craters of up to a few mm. diam., usually with a residual varnish or another solid in their center surrounded by a hollow space in the film of a coating. Cissing is defined as the partial creeping, backing and contracting of the film under formation of indented or beading border lines and (or) uncovered islands, or even only pinholes where the base substratum becomes visible—the film thickness is partly uneven. Blistering has to be distinguished between uncracked and cracked blisters. The uncracked blisters are pearlike occlusions of different diams. in the film of a coating. The cracked blisters are hollow spaces in the film without a nucleus, in contrast to most pinholes. In many cases the failure is due to the content of incompletely dissolved particles in the vehicles, in others to insufficient wetting. Conditions under which failures are likely to occur and the theories of various authors for pinholing and cissing are discussed.

W. H. BOYNTON, *Chemical Abstracts*

The Nature of Electrodeposited Silver-Cadmium Alloys. YA. S. UMANSKII and V. I. LAINER. *Sbornik Nauch. Trudov Moskov. Inst. Tsvetnykh Metal. Zolota* **1940,** No. 8, 95-8; *Khim. Referat. Zhur.* **4,** No. 3, 77 (1941).—Ag-Cd alloys were deposited at 18°C. and c. ds. of 0.5-3.5 amp./sq. dm. from an electrolyte contg. Ag 30 g./l. (in the form of the cyanide complex, Cd 15 g./l. (in the form of the cyanide complex), free KCN 8 g./l., K_2SO_4 15 g./l. and $K_2C_2H_2O_6$ 7.5 g./l. Copper foil was used as cathode and Pt as anode. Increasing the c. d. increased the percentage content of Cd in the deposit. X-ray analysis showed that the lattices of the electrodeposited alloys were identical with those of alloys obtained by crystallization from metals. However, in the region of the β-phase (Ag. 44-57%) there was found another phase, β'-phase, with a hexagonal lattice, stable at low temps.

W. R. HENN, *Chemical Abstracts*

Polarographic Analysis of Copper and Zinc in Brass Plate. By WILLARD P. TYLER and WALTER E. BROWN. *Ind. & Eng. Chem., Analytical Ed.* **15,** 520-3 (1943). Methods of brass plate analysis for control purposes are either slow or inaccurate. A new method for brass deposits on steel is described, which may be completed in 20 minutes, and which requires only 10 minutes of the operator's time; thus, six analyses may be made in an hour. The brass plate is dissolved in ammoniacal ammonium persulfate. The solution is added to a supporting electrolyte containing ammonium hydroxide, ammonium chloride, sodium sulfite, and gelatin, and the mixture is analyzed by means of a polarograph, giving the ratio of copper to zinc. The method is accurate to within 1% of the copper percentage. Full details and procedure are given.

ERNEST H. LYONS, JR.

Electrochemical Measuring and Control Methods. By FRITZ LIENEWEG. *Osterr. Chem.-Ztg.* **45,** 73-81 (1942); *Chem. Abstracts* **37,** 4634 (1943). Means for the automatic control of pH are described. On unbuffered solutions, stepwise regulation with two or three controls is recommended. In some processes titration is preferred to pH measurements.

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BRANCH	May 1943	Change in Membership	Percent Change
HARTFORD	72	+35½	+49.3
ST. LOUIS	83	+26	+31.3
BRIDGEPORT	78	+20½	+26.2
BUFFALO	63	+16½	+26.1
INDIANAPOLIS	60	+12½	+20.8
SAN FRANCISCO	34	+ 6½	+19.1
CINCINNATI	55	+ 9	+16.3
GRAND RAPIDS	87	+13½	+15.5
CLEVELAND	105	+14½	+13.8
PITTSBURGH	55	+ 7½	+13.6
SPRINGFIELD	70	+ 8½	+12.1
CHICAGO	278	+30½	+10.8
TOLEDO	37	+ 4	+10.8
DETROIT	280	+29	+10.3
NEW YORK	139	+12	+ 8.6
TORONTO	99	+ 8	+ 8
NEWARK	174	+14	+ 8
BALTIMORE-WASH.	98	+ 6	+ 6.1
MONTREAL	50	+ 2½	+ 5
BOSTON	117	+ 4½	+ 3.8
PHILADELPHIA	132	+ 5	+ 3.7
WATERBURY	103	+ 1½	+ 1.4
DAYTON	96	—	—
JACKSON	—	—	—
SYRACUSE	46	— 1	— 2.1
ROCHESTER	86	— 3	— 3.4
LOS ANGELES	117	— 3½	— 3.8
PROV.-ATTLEBORO	54	— 2½	— 4.6
LANCASTER	43	— 2	— 4.6
MILWAUKEE	93	— 4½	— 4.8
NEW HAVEN	103	—18	—17.4
ANDERSON	30	— 5½	—18.3

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By

DR. GEORGE DUBPERNELL, *United Chromium, Inc.*

Grinding Wheels and Their Uses. J. Heywood. Second Edition. 436 pages. Penton Publishing Company, Cleveland, Ohio. 1942. Price $3.00.

This is an excellent book in a field where there are very few publications. It is written under the auspices of the Grinding Wheel Manufacturers Association. The first edition published in 1938 contained two chapters relating to polishing and buffing which have been omitted in the new edition and transferred to the booklet reviewed below. The second edition of the present book contains new chapters on grinding discs, threads, gears, dies and molds; on lapping, honing and superfinishing; and on preparing metallographic specimens. Other subjects covered are: Abrasive Materials; How Grinding Wheels Are Made; Theory of Grinding; Surface Qualities and Finishes; Selecting the Right Wheel for the Job; Wheel Shapes and Sizes; Truing, Dressing, and Balancing; Use of Grinding Fluids; Tool and Cutter Sharpening; Sharpening Cemented Carbide Tools; Cylindrical Grinding; Grinding Cams and Other Out-of-Round Surfaces; Roll Grinding; Internal Grinding; Surface Grinding; Centerless Grinding; Cutting Off With Abrasive Wheels; Use of Abrasives in Non-Metalworking Industries; Grinding Castings, Welds and Billets; How to Cut Costs and Increase Production; and Some Tips for Product Designers. The Appendices include fifteen Tables of Wheel Recommendations; Lapping Compound Recommendations; Wheel Breakage and Safety Tips; Standard Grinding Wheel Markings; and a Glossary of Trade Names. There is a good index and the book is well illustrated with more than one figure per page. The author states in the Foreword to the Second Edition that:

"More stress has been laid on typical ingenious knacks for solving difficult grinding problems, and on designing parts to permit their being ground instead of machined by other methods when grinding will produce a better product, or will increase production, or decrease costs—as it usually will."

"The book is a clearing house of information to which many hundreds of men and shops have contributed not only their practical and theoretical knowledge, but also descriptions of the various grinding practices and methods which they have found best."

Abrasive Grains and Their Uses. J. Heywood. 72 pages. Penton Publishing Company, Cleveland, Ohio, 1943. Price $1.00.

This booklet is published under the auspices of the Abrasive Grain Association. The Foreword states that:

"It does not pretend to be an exhaustive treatment of the subject. Take the one subject of polishing and buffing, alone. To tell in detail how best to polish and buff all of the hundreds of different materials, under particular shop conditions, and with the various types of available equipment, would take probably thousands of pages.

So, throughout the booklet we have selected a few typical examples of the effective use of abrasive grain in various jobs, and have described them in enough detail so that they should be helpful in guiding the reader to the solution of his own peculiar problems."

There are chapters on the Abrasive Materials; Materials Used for and Methods of Polishing, Flexible Grinding and Buffing; Lapping With Abrasive Grain; the Glass and Optical Industries; and Miscellaneous Uses of Abrasive Grain, with a Glossary of Trade Names and a good Index. The booklet is excellent as far as it goes, but the reviewer was surprised to find that it appeared to contain almost no information on sand blasting directly as a separate subject.

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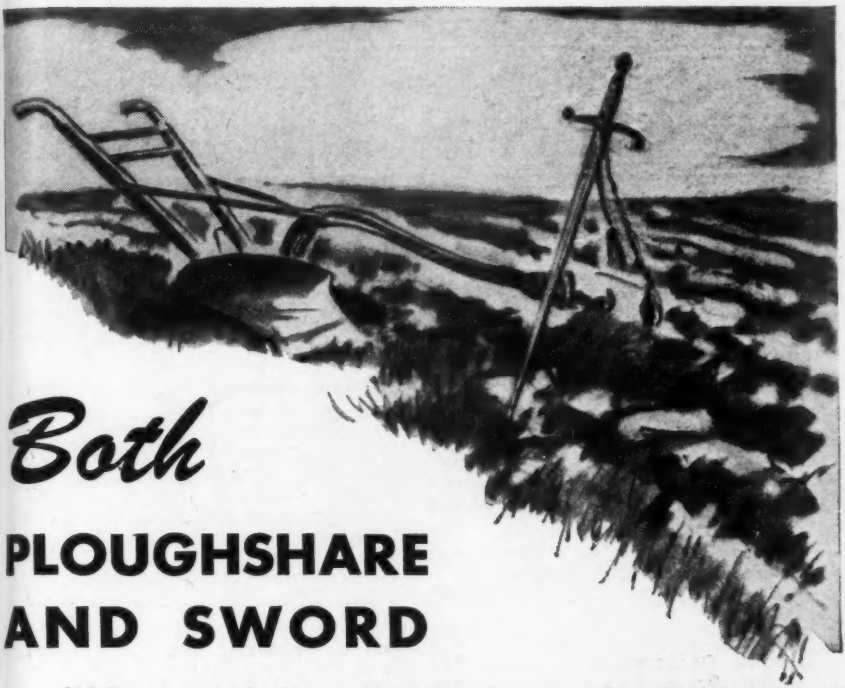

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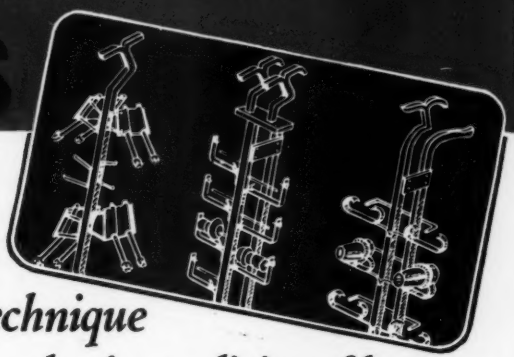

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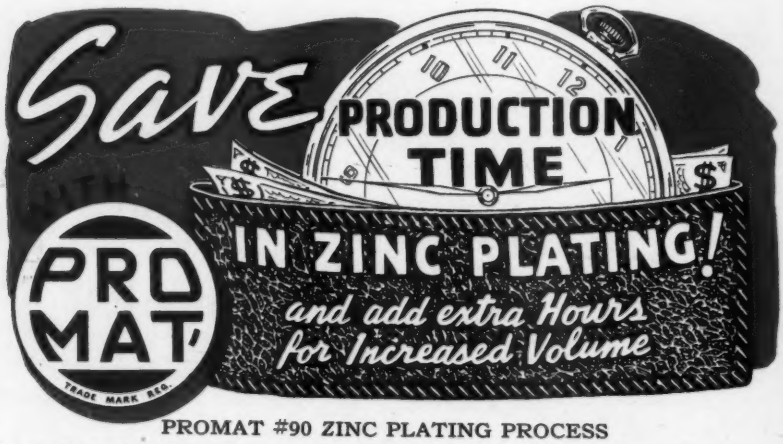

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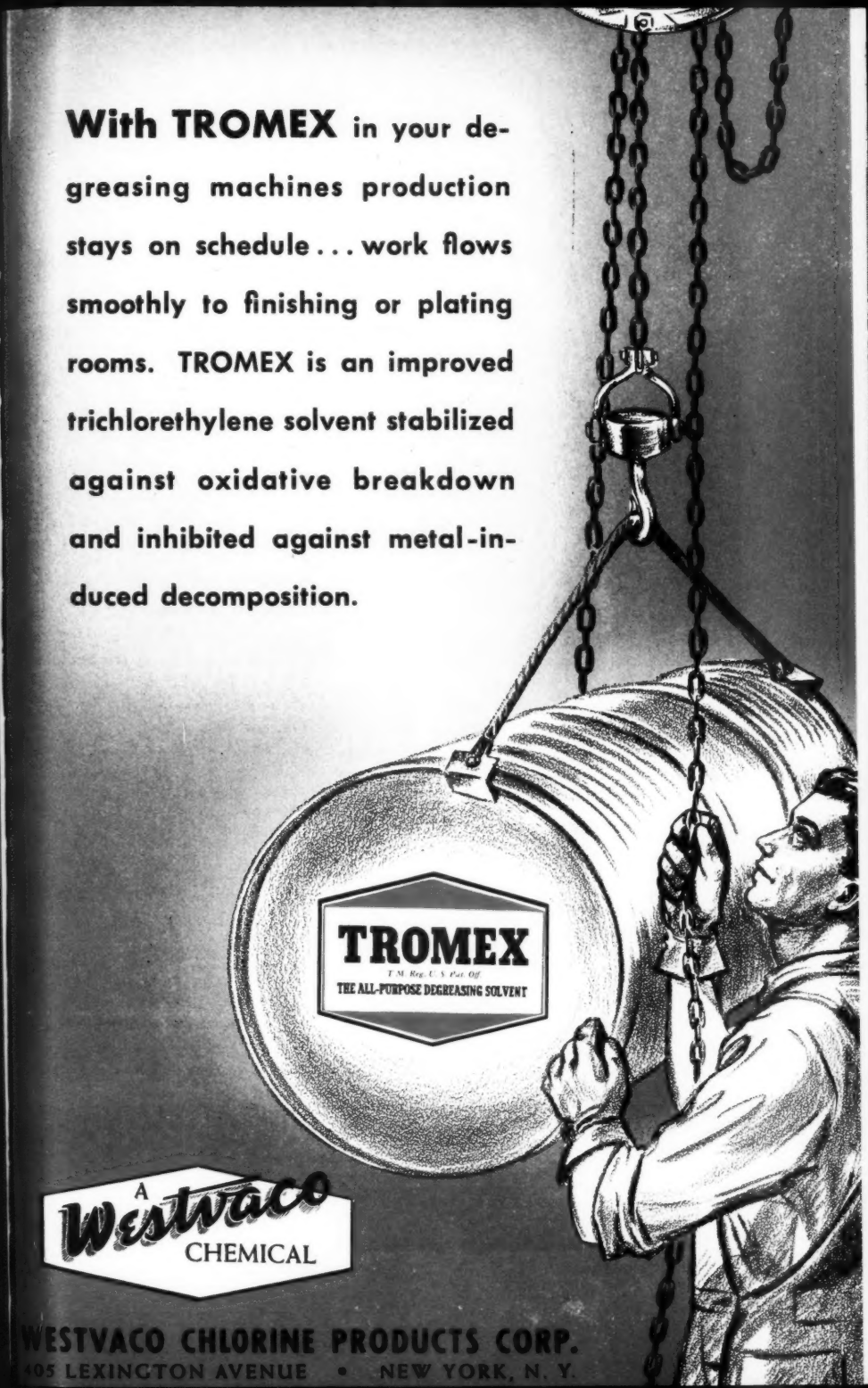
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